INTERNATIONAL STANDARD

ISO 13784-2

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Reaction-to-fire tests for sandwich panel building systems —

Part 2: Test method for large rooms

Essais de réaction au feu des systèmes de fabrication de panneaux de type sandwich —

Partie 2: Méthode d'essai pour des chambres de grande taille

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 13784 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 13784-2 was prepared by Technical Committee ISO/TC 92, *Fire safety*, Subcommittee SC 1, *Fire initiation and growth*.

ISO 13784 consists of the following parts, under the general title *Reaction-to-fire tests for sandwich panel building systems*:

— *Part 1: Test method for small rooms*

— *Part 2: Test method for large rooms*

Introduction

Fire is a complex phenomenon, its behaviour and effects dependent 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 (for the philosophy of reaction-to-fire tests, see ISO/TR 3814).

The need for improved insulation of buildings has led to the increased use of insulating sandwich panel systems in different parts of the building industry. Sandwich panel systems are applied as external cladding on factory buildings, in internal envelopes with controlled atmospheres and in cold stores — varying from small rooms to large, cool houses. Other applications are in modular building rooms and, sometimes, retail premises. These systems can also be used for roof applications in traditional constructions. Multi-layered panels with other facings (e.g. plasterboard) or sandwich panel systems can also be applied to walls as internal linings or insulation; however, this is not within the scope of ISO 13784.

There exist three primary fire-related threats to the walls and ceilings or roofs of a building insulated with freestanding or frame-supported types of sandwich panel systems:

a) an interior compartment fire impinging directly onto the joints of the wall, typical ignition sources being welding torches, burning items near the wall and fire in an adjacent room;

b) an external fire or combustibles (rubbish, vegetation, vehicles, etc.) accumulated near the wall;

c) fire spread to outside spaces.

Moreover, such a fire can spread in several ways:

— over a combustible exterior surface;

— by travelling vertically and horizontally through the combustible cores of cavities within the external wall or ceiling/roof;

— through combustible gases which have developed due to the pyrolysis of the combustible components and which will ignite on the surface;

— as burning debris or flaming droplets.

This part of ISO 13784 deals with a simple representation of a fire scenario involving a sandwich panel system — such as that typified by a local fire impinging directly on the internal face of a sandwich panel building construction. The test method specified can be used to provide a large-room scale, end-use evaluation of all aspects of sandwich panel systems, including constructional techniques (supporting frameworks, jointing detail, etc.)

The test method is intended for evaluating products which, by their nature, are not normally used as internal linings and are unsuitable for assessment using ISO 9705[1], which evaluates fire growth from a surface product. Nevertheless, this part of ISO 13784 provides a means by which a freestanding or frame-supported sandwich panel building construction can be built and evaluated.

Testing of this type can be used for comparative purposes or to ensure the existence of a certain quality of performance considered to have a bearing on fire performance generally; it does not rely on the use of asbestos-based materials.

Reaction-to-fire tests for sandwich panel building systems —

Part 2:
Test method for large rooms

SAFETY PRECAUTIONS — In order 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 concerned 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. Operators should use protective clothing, helmet, face-shield and equipment for avoiding exposure to toxic gases.

Laboratory safety procedures shall be set up which ensure the safe termination of tests on sandwich panel products. Specimens with combustible content burning inside metallic facings can be difficult to extinguish with standard laboratory fire fighting equipment. Adequate means of extinguishing such a fire shall be provided.

When tests are conducted using the freestanding or frame-supported constructions, specimens could emit combustion products from their external faces, especially if joints open up. Specimen collapse can also occur. Laboratory safety procedures shall be set up to ensure the safety of personnel with due consideration to such situations.

For construction of the test enclosure using a freestanding structure without structural framework, because of the size and weight of the individual panels it is strongly recommended that construction be accomplished within an additional external support framework (e.g. scaffolding). If the test enclosure is erected in an outside environment, it is further recommended that the external framework remain in place during the test. The task of this framework is only to avoid collapse of the test room caused by wind action. This additional framework shall not be used to fix and support the sandwich panels.

1 Scope

This part of ISO 13784 specifies a test method for evaluating the reaction-to-fire performance of sandwich panel building systems for large rooms and the resulting flame spread on or within the sandwich panel building construction when it is exposed to heat from a simulated internal fire with flames impinging directly on its internal corner. The test method is not intended for evaluating a product's fire resistance.

This part of ISO 13784 is applicable to both freestanding and self-supporting, and frame-supported, sandwich panel systems, but only to wall and ceiling or roof constructions.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 13784. 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 13784 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/TR 9705-2, *Reaction-to-fire tests — Full-scale room tests for surface products — Part 2: Technical background and guidance*

ISO 13784-1, *Reaction-to-fire tests for sandwich panel building systems — Part 1: Test method for small rooms*

ISO 13943, *Fire safety — Vocabulary*

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

3 Terms and definitions

For the purposes of this part of ISO 13784, the terms and definitions given in ISO 13943 and the following apply.

3.1
composite
combination of materials generally recognized in building construction as discrete entities

EXAMPLE Coated or laminated materials.

3.2
exposed surface
surface of the product subjected to the heating conditions of the test

3.3
product
material, composite or assembly

3.4
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 by 0,1 g, whichever is greater

3.5
surface product
any part of a building constituting an exposed surface on the walls or ceiling/roof, or on both

EXAMPLE Panel or board.

3.6
insulating sandwich panel
multi-layered product consisting of three or more layers bonded together

NOTE One layer is an insulating material, such as mineral or glass wool, cellular plastics or a natural material (e.g. corkboard), protected by facings on both sides. Facings can be selected from a variety of materials and can be either flat or profiled. The most widely used facing is coated steel. The composite can vary from a simple construction to a complex composite system with specific fixing joints and supports, depending on the application and on the performance requirements.

3.7
specimen
assembly representing the end-use construction

4 Principle

The reaction to fire performance of a sandwich panel assembly is assessed when it is exposed to flames impinging directly on the internal corner of a sandwich panel assembly. The different kinds of flame spread that can occur are flame spread within the internal core, on the surface or through joints, by ignited combustible gases and by falling