INTERNATIONAL STANDARD

ISO 12468-1

Second edition
2013-11-01

External exposure of roofs to fire —

Part 1: Test method

Exposition des toitures à un feu extérieur —

Partie 1: Méthode d'essais

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ISO 12468-1:2013
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Reference number
ISO 12468-1:2013(E)

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Published in Switzerland

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Contents

Page

iTeh STANDARD PREVIEW
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ISO 12468-1:2013
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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

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The committee responsible for this document is ISO/TC 92, *Fire Safety*, Subcommittee SC 2, *Fire Containment*.

This second edition cancels and replaces the first edition (ISO 12468–1:2003), of which it constitutes a minor revision.

ISO 12468-1:2013
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ISO 12468 consists of the following parts, under the general title *External exposure of roofs to fire*:

— *Part 1: Test method*

— *Part 2: Classification of roofs*

— *Part 3: Commentary*

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Introduction

This part of ISO 12468 specifies a test method that relates to the effects of fires on roofs. The test method described in this part of ISO 12468 represents the effect of three levels of fire exposure.

— Level A: A large burning brand coming from an adjacent building and falling onto the roof. Level A considers the effects of wind and additional radiant heat.

— Level B: A medium burning brand coming from a fire in a neighbourhood and falling onto the roof. Level B considers the effect of wind but without additional radiant heat.

— Level C: A small burning brand transported by the wind from a remote fire and falling onto the roof. Level C considers the effect of wind but without additional radiant heat.

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External exposure of roofs to fire —

Part 1:
Test method

1 Scope

CAUTION — The attention of all persons concerned with managing and carrying out this fire test is drawn to the fact that fire testing may be hazardous and that there is a possibility that toxic and/or harmful smoke and gases may be evolved during the test. Mechanical and operational hazards may also arise during the construction of the test elements or structures, their testing, and disposal of test residues. An assessment of all potential hazards and risks to health shall be made and safety precautions shall be identified and provided. Written safety instructions shall be issued. Appropriate training shall be given to relevant personnel. Laboratory personnel shall ensure that they follow written safety instructions at all times.

This part of ISO 12468 specifies a test method to determine the resistance of roofs to external exposure to fire. This method evaluates the behaviour of the roof when exposed to three types of burning brands combined with wind and with or without heat radiation, concerning

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a) the fire spread across the external surface of the roof,

b) the fire spread within the roof,

c) the fire penetration, and

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d) the production of flaming droplets or debris falling through the roof, from the underside of the roof, or from the exposed surface.

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*

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

EXAMPLE Sandwich panels.

3.2
burned material
material that has been destroyed by combustion or pyrolysis

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3.3
composite
combination of materials which are generally recognized in building construction as discrete entities

EXAMPLE Coated or laminated product such as roofing felt.

3.4
continuous deck
deck supporting the roof covering in which the gap between adjacent elements is not greater than 0,5 mm (5,0 mm in the case of wooden planks with plain edges)

3.5
damaged material
material that has been burned, melted, or otherwise visually changed by heat but does not include discoloration and soot deposits

3.6
exposed surface
external surface of the calibration element or of the specimen which is subject to the heat conditions

3.7
external fire spread
progression and extent of sustained flaming across the exposed surface of the specimen

3.8
fire penetration
any opening, sustained flaming, or glowing due to combustion on the underside that appears during the test and/or the occurrence of any flaming droplets or debris falling through the specimen or from the underside

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Note 1 to entry: Charring or discoloration is not to be regarded as fire penetration.

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3.9
fire spread within the roof
extent of burned material in each functional layer inside the specimen

3.10
flaming droplets or debris
burning material falling from or through the specimen that continues to burn on the floor for at least 5 s

3.11
internal damage
extent of damaged material in each functional layer inside the specimen

3.12
material
basic single substance or a uniformly dispersed mixture of substances

EXAMPLE Metal, stone, wood, bitumen, concrete, or mineral wool.

3.13
measuring zone
area of the specimen within which measurements are made

3.14
opening
any hole greater than 10 mm × 10 mm that appears during the test which penetrates completely through the specimen

3.15
product
material (3.12), *composite* (3.3), or *assembly* (3.1) about which information is required

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3.16
profile pitch
repeating length between sections of a uniformly corrugated or undulating roof deck

3.17
roof system
covering and sealing systems including any insulating layers or vapour barriers with their supporting elements and roof lights or other closures for roof apertures that are intended to provide a weatherproof surface

Note 1 to entry: Elements with a slope greater than 70° are not considered as roofs in this part of ISO 12468.

3.18
roof covering
material (3.12) attached to the deck

3.19
specimen
representative section of the roof system prepared for the purpose of test

3.20
sustained flaming
flaming arising from an observed location, which persists for 5 s or longer

3.21
underside
bottom surface of the specimen

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4 Symbols

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Symbol	Description	Unit
v_1, v_2, v_3, v_4, v_5, v_6, v_7	Velocity of the air at the measuring points	metres per second (m/s)
α	Pitch (slope)	degrees (°)

5 Selection of test specimen pitch

Roof systems designed for only one pitch shall be tested at the actual design pitch.

Roof systems designed for more than one pitch shall be tested as follows:

a) for pitch (α) less than 5°, test at zero pitch;

b) for pitch (α) from 5° to 20°, test at 15°;

c) for pitch (α) greater than 20°, test at 30°.

6 Test specimens

6.1 General requirements

For each level of fire exposure, two specimens shall be tested with dimensions measuring 1 200 mm ± 10 mm in width × 2 000 mm ± 10 mm in length for each test pitch. (See Figures 1 and 2.) When this is not possible due to the size of the roof light or other closure, a larger specimen shall be used.

NOTE Roof lights cause difficulties due to their size, shape, composition, and fire behaviour. Further guidance on the testing of roof lights will be presented in the next revision of this part of ISO 12468.

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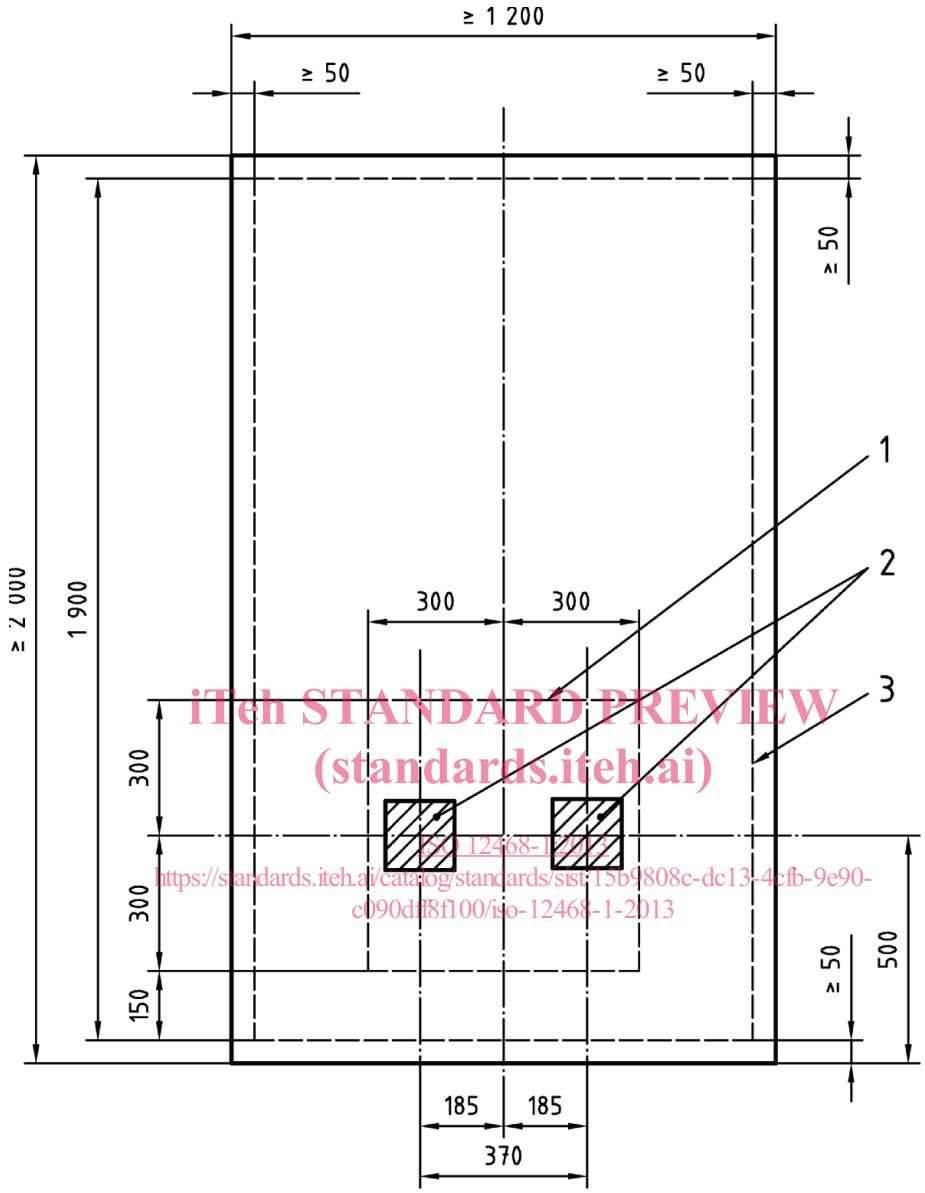
The specimens shall be representative in all details of the roof in practice.

Dimensions in millimetres with tolerances of ±10 mm



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ISO 12468-1:2013
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Key

1 radiant panel position
2 A brands
3 measuring zone

Figure 1 — Measuring zone and position of brands for Level A

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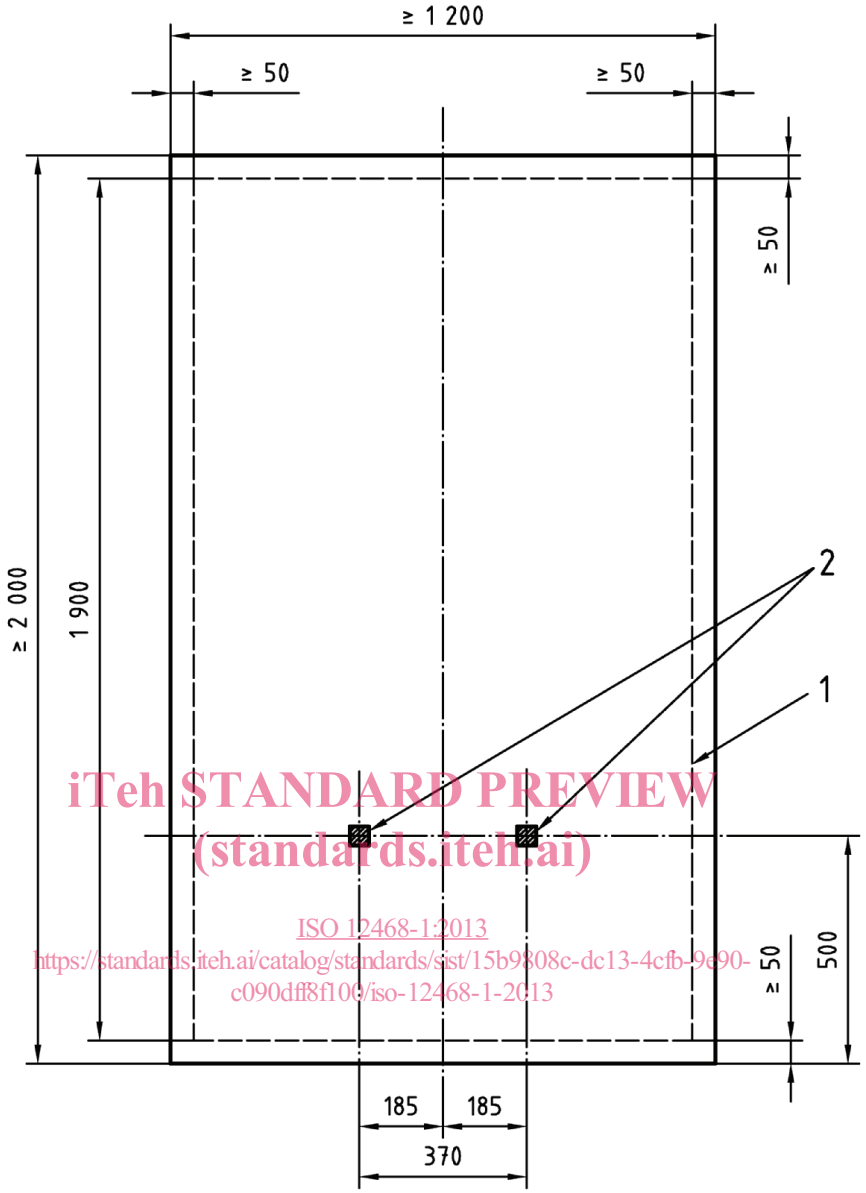

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ISO 12468-1:2013
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Key

1 measuring zone

2 B brands or C brands

Figure 2 — Measuring zone and position of the brands for Level B or Level C

6.2 Selection of standard supporting elements

6.2.1 For continuous decks

6.2.1.1 General

The test deck shall be selected in accordance with the following:

a) In the case of roof coverings intended to be installed over a continuous deck other than a profiled metal deck, a roof deck in accordance with 6.2.1.2 or 6.2.1.4 shall be used;

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b) If the materials will only be laid over a profiled metal deck, then a trapezoidal profiled metal deck, in accordance with 6.2.1.3, shall be used as the deck.

6.2.1.2 Wood particleboard decks

6.2.1.2.1 The wood particleboard shall consist of wood particles bonded with polymer adhesive (e.g. urea formaldehyde). This particleboard shall have a density of 680 kg/m^3 ± 50 kg/m^3 and shall not be treated with fire retardants.

6.2.1.2.2 A wood particleboard deck shall be constructed from planks 250 mm wide × 13 mm ± 1 mm thick running parallel to the eaves with plain edges and tightly butt jointed so that the gaps between planks do not exceed 0,5 mm.

6.2.1.2.3 If it is intended also to cover the case of decks made from wooden planks with plain edges, then these gaps shall be 5 mm ± 0,5 mm.

6.2.1.3 Metal decks

The trapezoidal profiled metal deck shall be made of aluminium or steel (subject to the expected field of application) and have the width of the crown approximately equal to 50 % of the profile pitch and a trough depth of approximately 100 mm. The corrugations shall run parallel to the eaves and be open at the ends.

6.2.1.4 Other non-combustible decks

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If roofing materials are intended to be laid only on continuous, non-combustible decks with a minimum thickness of 10 mm, then the test roof deck shall consist of 12 mm ± 2 mm thick reinforced calcium silicate board (oven dry density 900 kg/m^3 ± 100 kg/m^3).

ISO 12468-1:2013
https://standards.iteh.ai/catalog/standards/sist/15b9808c-dc13-4cfb-9e90-c090dff8f100/iso-12468-1-2013

6.2.2 For non-continuous decks

The spacing of roof supports of any type shall be in accordance with the maximum permissible spans proposed by the manufacturer for the particular application but not exceeding the minimum dimensions specified for the specimen in 6.1.

6.3 Positioning of joints

6.3.1 General

The joints shall be representative of practical application. In the case of overlapping layers, the position of the joints shall be considered to be the edge of the upper layer.

6.3.2 Description of specimen types with respect to joints

Where the dimensions of the elements of any of the layers are such that it requires more than four pieces to cover the specimen, or if any of the layers are without joints, then the specimens shall be fabricated such that those layers are representative of actual field practice (see Figures 3 and 4).

Specimens are categorized by the following types:

— **Type 1**: Single central vertical joint in the top layer. Single horizontal joint in the top layer under position of the left brand. Single vertical joint in layer next to top layer under position of the right brand. Single vertical joint in insulation under position of the left brand [see Figure 4 a), Type 1];

— **Type 2**: Single vertical joint in the top layer under position of the right brand. Single vertical joint in layer next to insulation under position of the left brand [see Figure 4 b), Type 2];

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