
**Reaction to fire test for sandwich
panel building systems —
Intermediate-scale box test**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO/TS 23657:2022](https://standards.iteh.ai/catalog/standards/sist/fcf244a4-5e46-4873-bba6-7841469bd267/iso-ts-23657-2022)

<https://standards.iteh.ai/catalog/standards/sist/fcf244a4-5e46-4873-bba6-7841469bd267/iso-ts-23657-2022>



iTeh STANDARD PREVIEW (standards.iteh.ai)

ISO/TS 23657:2022

<https://standards.iteh.ai/catalog/standards/sist/fcf244a4-5e46-4873-bba6-7841469bd267/iso-ts-23657-2022>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2022

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

	Page
Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle	1
5 Types of systems	2
5.1 General.....	2
5.2 Type A: frame-supported structures.....	2
5.3 Type B: free-standing structures.....	2
6 Test specimen	2
7 Test method	2
7.1 Constructing the test specimen (box-shaped).....	2
7.2 Constructing the enclosure around the test specimen.....	5
7.2.1 General.....	5
7.2.2 The walls and ceiling of the enclosure.....	5
7.2.3 The floor of the enclosure.....	5
8 Ignition source	7
8.1 Structure.....	7
8.2 Position.....	7
8.3 Burner power output.....	7
9 Instrumentation	7
9.1 Thermocouples.....	7
9.2 Additional equipment.....	9
9.2.1 Data recorder.....	9
9.2.2 Timing device.....	9
9.2.3 Heat and smoke release measurement.....	9
10 Test procedure	9
10.1 Initial conditions.....	9
10.2 Test.....	9
11 Precision	10
12 Test report	10
Annex A (informative) Examples of specimen drawings	12
Bibliography	14

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.

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 92, *Fire safety*, Subcommittee SC 1, *Fire initiation and growth*.

ISO/TS 23657:2022

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

This document is intended to provide a test method for describing the fire behaviour of a sandwich panel product under fire conditions by simulating such fire conditions in a box made of sandwich panels under controlled laboratory conditions.

This test method may be used for comparing the reaction-to-fire properties of sandwich panel products. ISO 13784-1 and ISO 13784-2 are used to give a more realistic end-use assessment of the performance of sandwich panels, including self-standing capability during fire.

Examples of specimen drawings are provided in [Annex A](#).

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[ISO/TS 23657:2022](#)

<https://standards.iteh.ai/catalog/standards/sist/fcf244a4-5e46-4873-bba6-7841469bd267/iso-ts-23657-2022>

Reaction to fire test for sandwich panel building systems — Intermediate-scale box test

1 Scope

This document specifies a method of testing the reaction-to-fire properties of an intermediate-scale, box-shaped structure made up of sandwich panels. This test method is a screening method intended for use by producers to reduce the burden of testing in ISO 13784-1, especially with respect to the occurrence of flashover.

This test method is not applicable to determining self-standing capability during fire, which is instead examined using ISO 13784-1 or ISO 13784-2.

This method is not intended to evaluate the reaction-to-fire performance of facades, or the fire resistance of a product, which can be tested by other means.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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, *Fire safety — Vocabulary*

ISO 13784-1, *Reaction to fire test for sandwich panel building systems — Part 1: Small room test*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Principle

The reaction to fire performance of a sandwich panel assembly is assessed when exposed to flames impinging directly on the internal corner of a small box-shaped sandwich panel assembly. The different kinds of flame spread, for example within the internal core, on the surface or through joints, and through ignited combustible gases and falling debris or melting droplets of the sandwich panel assembly, are assessed to allow the following possible fire hazards to be determined:

- a) the contribution of the system to fire development before and after flashover;
- b) the development of smoke and fire gases generated from the specimen box made of sandwich panels.

5 Types of systems

5.1 General

The test method applies to the following two types of structures which are representative of those used in practice, both in construction and materials.

5.2 Type A: frame-supported structures

For these types of structures, sandwich panel systems are mechanically fixed to the outside or the inside of a structural framework, normally steel. The ceiling/roof may be built traditionally or with sandwich panel systems.

When using a frame, the deformation of the frame can influence the fire behaviour of the sandwich panels. The test recommends that the frame be protected in practice according to relevant fire resistance requirements. Protection can be obtained by means of insulating boards or coatings.

5.3 Type B: free-standing structures

Sandwich panel systems are assembled together to provide a room or enclosure which does not depend for its stability on any other structural framework, e.g. cold stores, or food or clean rooms. These rooms are normally situated inside a building.

6 Test specimen

The test specimen used shall consist of the requisite number of panels specified in the test method to be performed. In all cases, the test specimen shall be representative of that used in practice, both in construction and materials. All constructional details of joints, fixings, etc., shall be reproduced and positioned in the test specimen as in practice. The test specimen should be built by those suitably qualified in the construction of this type of structure.

NOTE 1 If, in practice, ceiling panels are different from wall panels, a test can be performed with the correct combination of wall and ceiling panels.

If the sandwich panel building system is intended to be used with decorative paint or film facings, these shall be present on the test specimen.

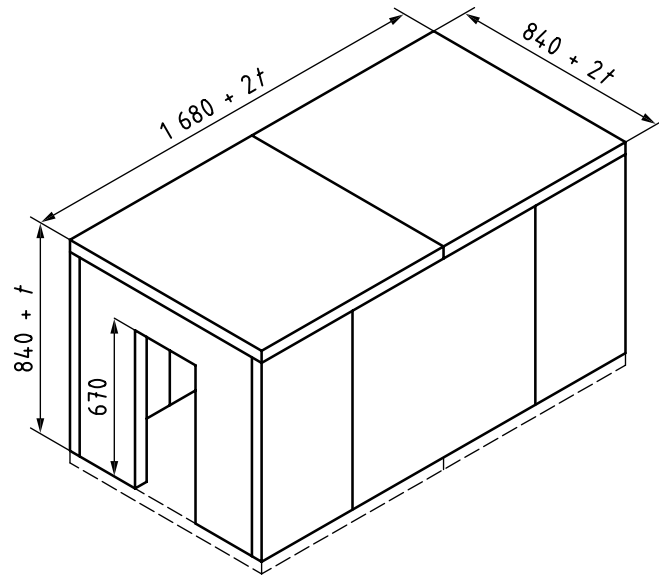
7 Test method

7.1 Constructing the test specimen (box-shaped)

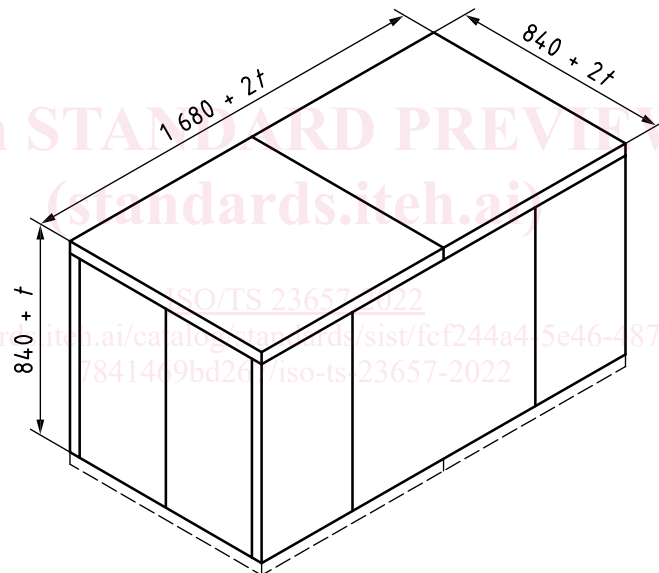
The shape of the specimen and the number of joints and their locations shall be as shown in [Figure 1](#). However, the number of joints may be increased around the opening according to the actual construction method. The internal dimensions of the specimen shall be as follows.

- 1) Depth: 1 680 mm ± 10 mm
- 2) Width: 840 mm ± 10 mm
- 3) Height: 840 mm ± 10 mm
- 4) Width of opening: 300 mm ± 10 mm
- 5) Height of opening: 670 mm ± 10 mm

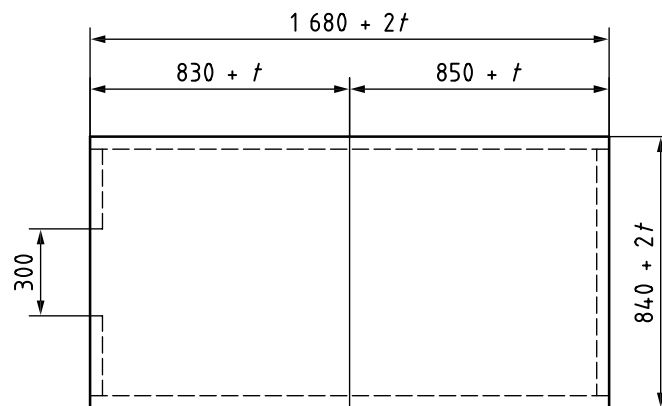
Dimensions in millimetres



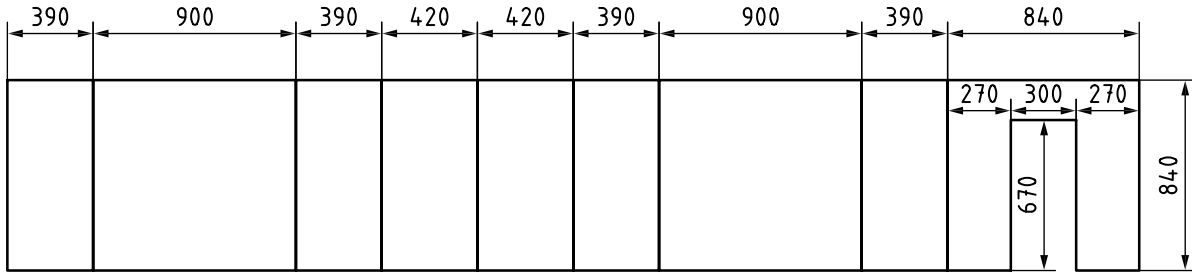
a) Isometric drawing (front)



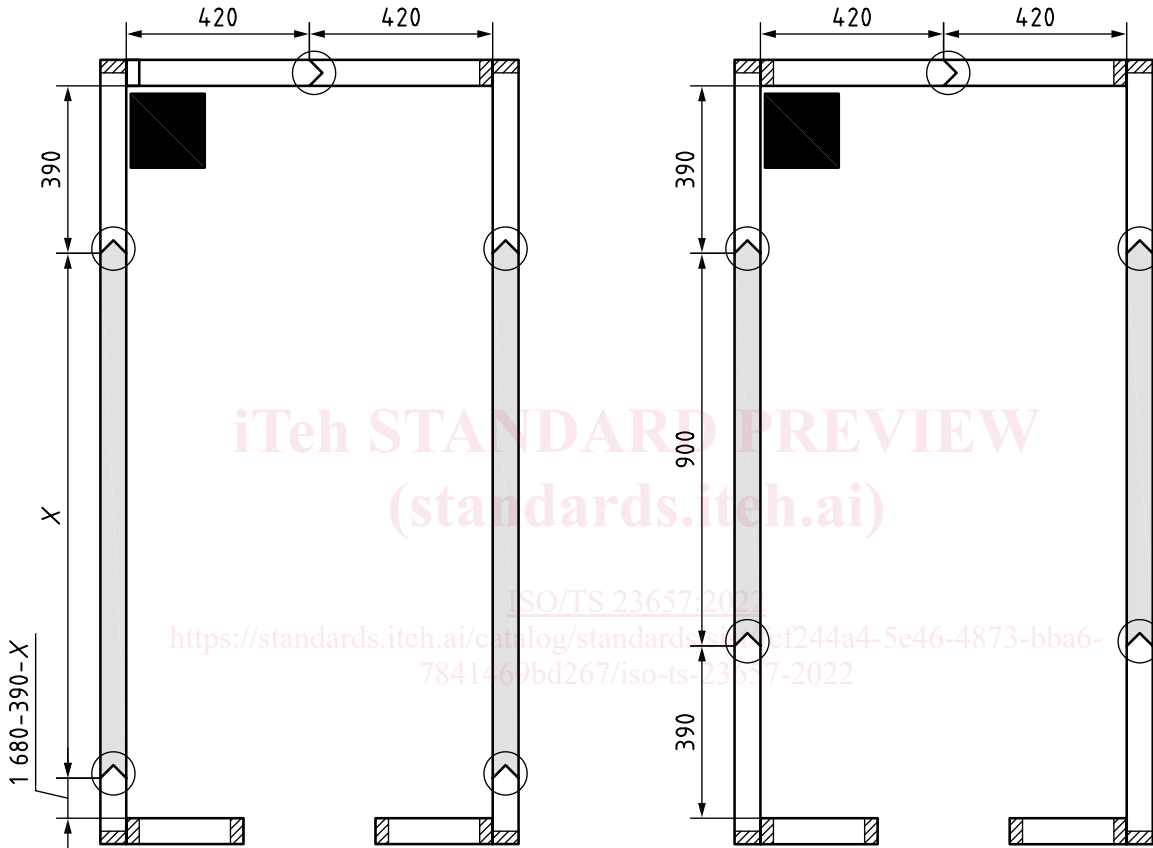
b) Isometric drawing (rear)



c) Reflected ceiling plan (opening on the left side)



d) Wall development view seen from inside (example)



e) Panel layout (rule)

f) Panel layout (example)

Key

t thickness of a sandwich panel

Figure 1 — Example of test specimen

Information on the test specimen shown in [Figure 1 a\)](#) through [Figure 1 d\)](#) represents a standard situation. There can be some variance on the panel width prescribed by the specimen suppliers when it is impossible to follow the standard situation in [Figure 1 a\)](#) through [Figure 1 d\)](#) exactly.

[Figure 1 e\)](#) shows the rule of panel layout, while in [Figure 1 f\)](#) shows an example of panel layout.

7.2 Constructing the enclosure around the test specimen

7.2.1 General

An enclosure as shown in [Figure 2](#) shall be provided around the specimen to prevent the diffusion of the combustion product and heat.

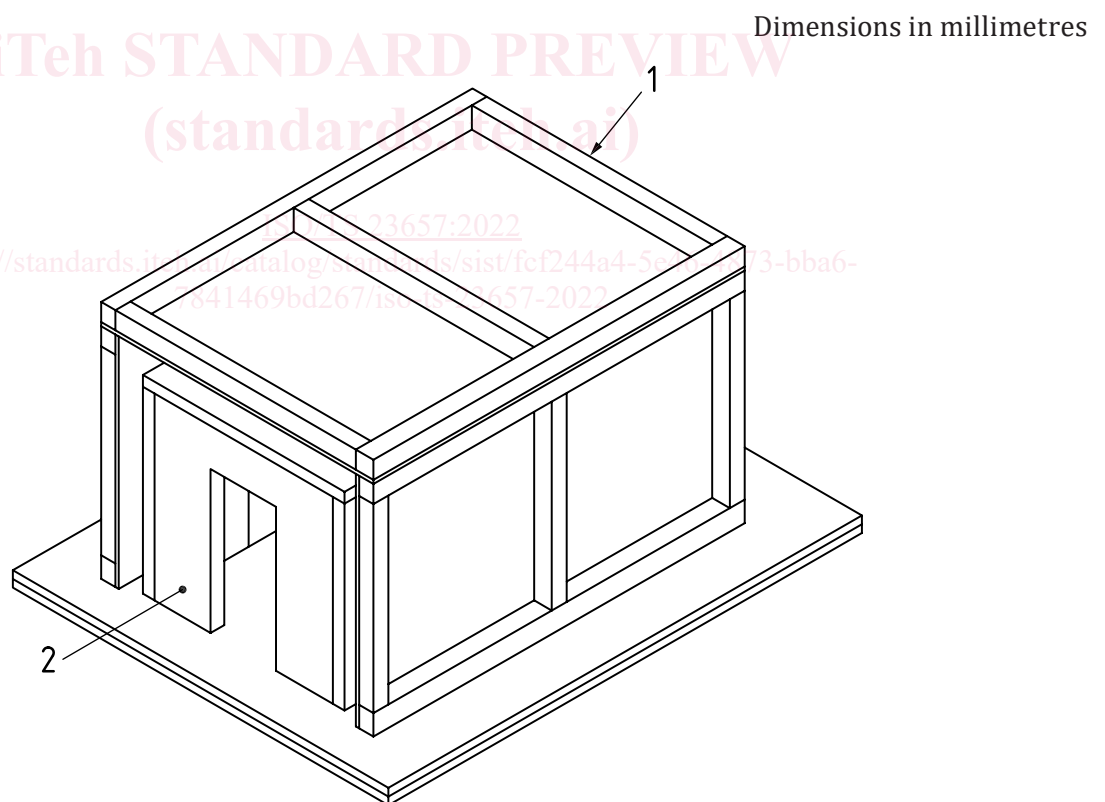
7.2.2 The walls and ceiling of the enclosure

The walls and ceiling of the enclosure shall be as follows.

- a) The walls and ceiling of the enclosure shall be composed of the 12 mm thick 0,8 calcium silicate boards and used in testing after being fully dried. The walls and ceiling shall be reinforced with steel or another non-combustible material from the outside to prevent collapse during testing.
- b) The walls and ceiling of the enclosure shall be such that every internal surface of the enclosure will be 50 mm \pm 10 mm from the outermost surface of the sandwich panel.

7.2.3 The floor of the enclosure

The floor of the enclosure shall be composed of the two 25 mm thick 0,5 calcium silicate boards and used in testing after being fully dried.



a) Isometric drawing (front)