
**Reaction to fire tests — Ignitability
of products subjected to direct
impingement of flame —**

**Part 2:
Single-flame source test**

*Essais de réaction au feu — Allumabilité de produits soumis à
l'incidence directe de la flamme —*

Partie 2: Essai à l'aide d'une source à flamme unique

Document Preview

ISO 11925-2:2020

<https://standards.iteh.ai/catalog/standards/iso/564b48fc-2a44-46b0-abca-495321ea4d05/iso-11925-2-2020>



iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO 11925-2:2020

<https://standards.iteh.ai/catalog/standards/iso/564b48fc-2a44-46b0-abca-495321ea4d05/iso-11925-2-2020>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2020

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
Fax: +41 22 749 09 47
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 Test apparatus	2
5 Test specimen	4
5.1 Preparation.....	4
5.2 Dimensions.....	4
5.3 Products which are not essentially flat.....	4
5.4 Number of specimens.....	4
5.5 Substrates.....	5
6 Conditioning	5
7 Test procedure	5
7.1 General.....	5
7.2 Preliminary operations.....	5
7.3 Testing operations.....	5
7.4 Duration of test.....	7
8 Expression of results	7
9 Test report	8
Annex A (informative) Precision of test method	22
Annex B (normative) Testing not essentially flat end-use products	25
Annex C (normative) Testing perforated end-use products	26
Bibliography	27

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*.

This fourth edition cancels and replaces the third edition (ISO 11925-2:2010), which has been technically revised. It also incorporates the Technical Corrigendum ISO 11925-2:2010/Cor1:2011.

A list of all parts in the ISO 11925 series can be found on the ISO website.

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 fire test method has been developed to define reaction to fire performance of products. The method specifies a test for determining the ignitability of products by direct small-flame impingement under zero impressed irradiance using vertically oriented test specimens.

Although the method is designed to assess ignitability, this is addressed by measuring the spread of a small flame up the vertical surface of a specimen following application of a small (match-sized) flame to either the surface or edge of a specimen for either 15 s or 30 s. The determination of the production of flaming droplets/particles depends on whether or not the filter paper placed beneath the specimen ignites.

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[ISO 11925-2:2020](https://standards.iteh.ai/catalog/standards/iso/564b48fc-2a44-46b0-abca-495321ea4d05/iso-11925-2-2020)

<https://standards.iteh.ai/catalog/standards/iso/564b48fc-2a44-46b0-abca-495321ea4d05/iso-11925-2-2020>

Reaction to fire tests — Ignitability of products subjected to direct impingement of flame —

Part 2: Single-flame source test

1 Scope

This document specifies a method of test for determining the ignitability of products by direct small flame impingement under zero impressed irradiance using vertically oriented test specimens.

Information on the precision of the test method is given in [Annex A](#) (informative).

Information on testing not essentially flat end-use products is given in [Annex B](#) (normative).

Information on testing perforated end-use products is given in [Annex C](#) (normative).

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.

EN 13238, *Reaction to fire tests for building products — Conditioning procedures and general rules for selection of substrates*

ISO 13943, *Fire safety — Vocabulary* [ISO 11925-2:2020](#)

ISO 14697, *Reaction-to-fire tests — Guidance on the choice of substrates for building and transport products*

3 Terms and definitions

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

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

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

3.1

product

material, element or component about which information is required

3.2

essentially flat product

product having one of the following characteristics:

- a) a planar exposed surface;

- b) a planar exposed surface with a surface irregularity that is evenly distributed over the exposed surface, provided that
- at least 50 % of the surface of a representative square area of 250 mm × 250 mm lies within a depth of 6 mm from a plane taken across the highest points on the exposed surface, or
 - for a surface containing cracks, fissures or holes, these do not exceed 6,5 mm in width or 10 mm in depth, and that the total area of such cracks, fissures or holes at the surface does not exceed 30 % of a representative square area of 250 mm × 250 mm of the exposed surface

3.3

flaming droplets/particles

material separating from the specimen during the fire test procedure and igniting the filter paper beneath the specimen

3.4

multi-layered products

product composed of two or more layers of different materials, which can be either substantial and/or non-substantial

[SOURCE: EN 13501-1:2018-12, 3.1.5 and 3.1.6]

3.5

sustained flaming

persistence of flame for a period greater than 3 s

3.6

ignition

presence of sustained flaming

4 Test apparatus

4.1 Test room, capable of providing an environment at $(23 \pm 5) ^\circ\text{C}$ and a relative humidity of $(50 \pm 20) \%$.

NOTE It has been found that a partially darkened room assists with the perception of small surface flames.

4.2 Combustion chamber, consisting of an enclosure constructed from stainless steel sheets, with heat-resistant, glazed doors provided for access and observation in at least the front and one lateral side (see [Figure 1](#)). Ventilation of the enclosure shall be free through the square box section base in the bottom of the chamber. This shall be made of stainless steel of 1,5 mm thickness, 50 mm in height, with the open square area being 25 mm × 25 mm. To make free ventilation possible, the chamber shall stand on 40 mm high supports which provide a gap on the lateral sides of the combustion chamber. The air velocity measured on the central axis in the chimney of the combustion chamber shall be $(0,7 \pm 0,1) \text{ m/s}$, measured with the burner only ignited and with the ventilation hood “on”. The combustion chamber shall be situated under a suitably ventilated hood.

4.3 Ignition source, consisting of burner constructed as shown in [Figure 2](#) and designed so that it can be used vertically or be tilted at 45° with respect to the vertical axis. The burner shall be mounted onto a horizontal plate so that it moves smoothly forwards and backwards in a horizontal plane along the centreline of the combustion chamber.

The burner shall be fitted with a fine adjustment valve to ensure accurate control of the flame height.

4.4 Fuel, consisting of commercial propane of 95 % minimum purity. In order to obtain flame stability with the burner tilted at 45° , the gas pressure shall be between 10 kPa and 50 kPa.

4.5 Specimen holder, consisting of two stainless steel U-shaped frames. The thickness of the frames shall be (5 ± 1) mm. The dimensions of the frame shall be as shown in [Figure 3](#). The frame shall hang vertically from the support (see [4.6](#) and [Figure 7](#)) such that the underside of the specimen is exposed directly to the flame along its centreline and edges see [Figure 8](#). The two halves of the specimen holder shall be held together by screws or clamps to prevent the specimen warping.

It is important that the technique of clamping used be capable of restraining the specimen for the total duration of the test.

NOTE Small pins of approximately 1 mm in length incorporated on the surface of the frame to which the specimen is attached have been found suitable.

For multi-layered products, a typical test frame as shown in [Figure 4](#) shall be used when carrying out the prescribed additional set of tests on multi-layer test specimens of thickness greater than 10 mm according to [7.3.3.2.3](#).

For the mounting and fixing of loose fill material, the following applies.

- a) A specimen holder as shown in [Figure 5](#) shall be used.
- b) When making the specimens for testing, the surface of the loose fill material specimen shall be as even as possible.
- c) A wire lacing as shown in [Figure 6](#) shall be used to retain the specimen if material falls from the specimen holder. A wire of 0,2 mm diameter shall be used to form 11 rows vertically in front of the opening to hold the loose fill material in place. The wire lacing will have the shape of a harp.
- d) If the material is a mixture of various grain sizes, the release of smaller particles from the open central surface does not justify the use of the harp.
- e) It is deemed sufficient to carry out the tests with a surface flame attack. Edge flame attack tests are not necessary.

4.6 Support, consisting of a vertical stand to which the specimen holder is attached such that it hangs vertically and exposes its open edge containing the specimen to the burner flame (see [Figure 7](#)).

The distance between the underside of the specimen and the top of horizontal plate above the metal grid shall be (125 ± 10) mm for edge flame impingement and (85 ± 10) mm for surface flame impingement.

4.7 Timing device, capable of recording elapsed time to the nearest second and which shall be accurate to within 5 s in 1 h.

4.8 Template, consisting of one metal plate (250_{-1}^0) mm long and (90_{-1}^0) mm wide.

4.9 Flame checking devices.

4.9.1 Flame-height measuring device, capable of indicating a flame height of 20 mm (see [Figure 9](#)) when located against a fixed point of the burner. The tolerance on the flame-height measuring device shall be $\pm 0,1$ mm.

The flame height shall be measured from the upper edge of the burner to the yellow tip of the flame. The outer blue halo of the flame may not be considered. This check shall be conducted before testing each specimen.

4.9.2 Burner spacer for edge flame impingement, removable, 16 mm long, which can be mounted at the burner orifice to check the distance from the pre-set flame contact point on the specimen (see [Figure 10](#)).

4.9.3 Burner spacer for surface flame impingement, removable, cone-shaped, which can be mounted at the burner orifice to check the fixed distance of 5 mm between the burner edge and specimen surface (see [Figure 11](#)).

4.10 Anemometer, thermal anemometer with an accuracy of $\pm 0,1$ m/s, for measuring the airflow velocity in the upper outlet of the combustion chamber (see [4.2](#) and [Figure 1](#)).

4.11 Filter paper and tray. The paper shall be new undyed filter paper with a mass/unit area of (75 ± 15) g/m² and an ash content of less than 0,1 %. The tray shall be 100 mm × 50 mm and 10 mm deep and made of aluminium foil. The tray is placed beneath the specimen holder and is replaced between tests.

4.12 Apparatus to allow observation of the reverse face of the specimen. For some materials, it is sometimes necessary to observe the flame on the reverse face of the specimen as well as the exposed face.

Provision shall therefore be made to enable the operator to view both sides of the specimen at the same time. One method by which this may be achieved is to place a mirror such that the backside of the specimen can be monitored. The mirror shall not be placed above the specimen, in order to avoid disturbance of the airflow. The design and location of the mirror shall be appropriate for the construction of the equipment and the available ambient lighting. The result observed on the reverse face shall be treated as if it occurred on the front side.

5 Test specimen

5.1 Preparation

The test specimen shall be cut from a sample which is representative of the product to be tested using the templates specified in [4.8](#).

5.2 Dimensions

The dimensions of the test specimens shall be (250^{+2}_{-2}) mm long by (90^{+2}_{-2}) mm wide.

Specimens normally having a thickness of 60 mm or less shall be tested using their full thickness. Specimens normally having a thickness greater than 60 mm shall be reduced to a thickness of 60 mm by cutting away the unexposed surface. If it is necessary to reduce the specimen size in this manner, the cut surface shall not be exposed to the flame.

For products which are normally manufactured in sizes less than the test specimen, a test sample of appropriate size shall be specifically produced for the test.

5.3 Products which are not essentially flat

When the product is not an essentially flat product, the specimens may be tested in the form of their end use (e.g. pipe insulation). The product shall be supplied in its entirety or as specimens of lengths of 250 mm.

5.4 Number of specimens

5.4.1 For each exposure condition, a minimum of six representative specimens of the product shall be tested. Three specimens shall be cut lengthwise and three crosswise.

5.4.2 If a product under test is asymmetric through its thickness and in practice either face may be exposed to a source of ignition, test two specimens on each face to find the critical point of impingement. For the critical impingement point a full test series shall be conducted.

5.4.3 Where a product has areas of its surface which are distinctly different, but each of these separate areas can satisfy the surface characteristics for essentially flat products, two tests shall be conducted at each point of flame impingement. The critical impingement point shall be found. For the critical impingement point a full test series shall be conducted.

5.4.4 If a product is installed with covered edges, but can also be used with unprotected edges, tests shall be performed on both covered and uncovered specimens.

5.5 Substrates

Where a substrate is used, it shall be selected in accordance with ISO 14697 or EN 13238.

Care is needed when preparing test specimens for bottom-edge exposure of materials applied to substrates, since in practice the substrate may extend beyond the bottom of the material to be tested and not itself be subject to edge exposure. The configuration of the test specimen should reflect the practical aspects such as type of substrate and fixing to substrate.

NOTE Additional advice on the use of substrates can be found in any relevant product standard.

6 Conditioning

Test specimens and filter paper shall be conditioned in accordance with EN 13238.

7 Test procedure

7.1 General

Two flame application times are available, 15 s or 30 s, as required by the sponsor. The start time of the test is on application of the flame.

7.2 Preliminary operations

7.2.1 Check the required airflow velocity in the chimney of the combustion chamber (see [4.2](#)).

7.2.2 Remove the set of six test specimens and the filter paper from the conditioning environment and test them within 30 min. If necessary, the test specimen can be transferred from the conditioning room to the test apparatus in a sealed container.

7.2.3 Clamp the test specimen in the specimen holder so that one end and both sides are covered by the holder frames and the exposed end is 30 mm from the end of the frame (see [Figures 3](#) to [6](#)).

NOTE The operator can find it useful to mark the specimen holder such that the bottom edge of the test specimen is always placed at this distance.

7.2.4 Check the distances of the burner from the specimen by means of the relevant spacer specified in [4.9.2](#) or [4.9.3](#) with the burner tilted at 45° (see [Figures 7](#) and [8](#), as appropriate).

7.2.5 Position two pieces of filter paper in the aluminium foil tray beneath the specimen, not more than 3 min before the start of the test.

7.3 Testing operations

WARNING — The attention of all persons concerned with managing and carrying out this test is drawn to the fact that fire testing can be hazardous and that there is a possibility that toxic and/