
**Textile fabrics — Burning behaviour —
Determination of ease of ignition of
vertically oriented specimens**

*Textiles — Comportement au feu — Détermination de la facilité
d'allumage d'éprouvettes orientées verticalement*

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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 2.

The main task of technical committees is to prepare International Standards. 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 document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 6940 was prepared by Technical Committee ISO/TC 38, *Textiles*, Subcommittee SC 19, *Burning behaviour of textiles and textile products*.

This second edition cancels and replaces the first edition (ISO 6940:1984), which has been technically revised. It also incorporates the Amendment ISO 6940:1984/Amd.1:1993.

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Introduction

This method is one of two closely related methods of test for the inflammability of textile fabrics. It determines the ease of ignition, as defined in ISO 4880; the other method measures flame spread time (see ISO 6941).

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Textile fabrics — Burning behaviour — Determination of ease of ignition of vertically oriented specimens

1 Scope

This International Standard specifies a method for the measurement of ease of ignition of vertically oriented textile fabrics and industrial products in the form of single or multi-component fabrics (coated, quilted, multilayered, sandwich constructions, and similar combinations), when subjected to a small, defined flame.

This method assesses the properties of textile fabrics in response to flame contact under controlled conditions. Results may not apply to situations where there is restricted air supply or exposure to large sources of intense heat.

The influence of seams on the behaviour of fabrics can be determined by this method, the seam being positioned within the test specimen so as to be subjected to the test flame. Whenever practicable, trimmings should be tested as part of the fabric assembly on which they are, or will be, used.

2 Normative references

The following referenced documents are indispensable for the application 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 4880, *Burning behaviour of textiles and textile products — Vocabulary*

ISO 6941, *Textile fabrics — Burning behaviour — Measurement of flame spread properties of vertically oriented specimens*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

flame application time

time for which the ignition flame is applied to the test specimen

3.2

afterflame time

duration of flame

length of time for which a material continues to flame under specified test conditions, after the ignition source has been removed

NOTE Afterflame time is measured to the nearest second and afterflame times of less than 1,0 s should be recorded as zero.

3.3

ignition

initiation of combustion

3.4

sustained combustion

flaming of the specimen which gives an afterflame time of 5 s or more or which reaches the top or vertical edges in less than 5 s

3.5

minimum ignition time

minimum time of exposure of a material to an ignition source to obtain sustained combustion under specified test conditions

4 Principle

A defined flame from a specified burner is applied to the surface or bottom edge of textile specimens which are vertically oriented.

The mean ignition time is determined as the weighted mean of the measured flame application times to obtain ignition of the specimens.

5 Apparatus

5.1 Mounting frame, constructed to a design capable of holding the gas burner (5.2, see Figure 1) and the test specimen holder (5.3, see Figure 2) in the specified relative orientation (see Figure 3).

5.2 Gas burner, as described in Annex A, capable of being moved from a standby position, where the tip of the burner is at least 75 mm from the test specimen, to either the horizontal or inclined operating position (see Figure 3).

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5.3 Specimen holder, consisting of a rectangular metal frame having a specimen support pin at each corner of a rectangle of length 190 mm by width 70 mm (see Figure 2). The pins for supporting the specimen have a maximum diameter of 2 mm and a length of at least 26 mm.

NOTE Longer pins may be needed for mounting thick or multilayer specimens.

For the purpose of locating the specimen in a plane at least 20 mm away from the frame (see 9.1.1 and 9.2.1), a spacer stub of 2 mm diameter and a length of at least 20 mm shall be positioned adjacent to each of the four pins.

5.4 Template, flat and rigid, made of a suitable material and a size corresponding to the size of the specimen (200 mm × 80 mm). Holes approximately 4 mm in diameter are drilled in each corner of the template and positioned so that the distances between the centres of the holes correspond to the distances between the pins on the specimen holder (see Figure 2). The holes should be located equidistant about the vertical centreline of the template.

5.5 Gas, commercial grade propane or butane or butane/propane mixtures.

NOTE Commercial grade propane is preferred but other gases may be used.

5.6 Timing devices

5.6.1 A timing device to control and measure the flame application time, which can be set at 1 s and adjusted at 1 s intervals to an accuracy of 0,2 s or better.

5.6.2 Three timing devices reading to 0,2 s or better are required to measure the afterflame time. This device is started, preferably automatically, at the instant of test flame termination or removal, and is stopped manually.

6 Cautionary measures

6.1 Construction of testing equipment

Some products of combustion are corrosive. The equipment shall be constructed of material that will not be adversely affected by the fumes.

6.2 Location of test apparatus

The volume of air surrounding the test location shall not have any influence on testing. Where an open-fronted cabinet is used for the test, provision shall be made to allow the specimen to be mounted at least 300 mm from any wall.

6.3 Health and safety of test operators

Burning of materials may produce smoke and toxic gases that can affect the health of operators. Between tests, the atmosphere of the testing location, which shall be of adequate dimensions to avoid endangering the health of operators, shall be cleared of smoke and fumes by an extractor fan or other means of ventilation (see 6.2).

NOTE Smoke and fume emission may be subject to national regulations concerning atmospheric pollution control.

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7 Sampling

7.1 Number of specimens

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Mark out a set of twelve test specimens, using the template (5.4), to allow for at least five instances of ignition and five instances of non-ignition to occur.

Specimens should normally be tested with the length direction vertical and the outer face towards the igniting flame. If the test material is non-homogeneous and preliminary testing indicates dissimilar inflammability characteristics, length and width specimens should be tested separately. For surface ignition, where the two surfaces of the sample are visually dissimilar and preliminary testing indicates dissimilar inflammability characteristics, each surface shall be tested and the results reported separately.

An iterative procedure is used and the exact number of specimens cannot be stated. A minimum of 10 specimens is needed for each orientation. An extra test specimen is required for the setting-up procedure (see 9.1 and 9.2).

7.2 Specimen holder pin location marks

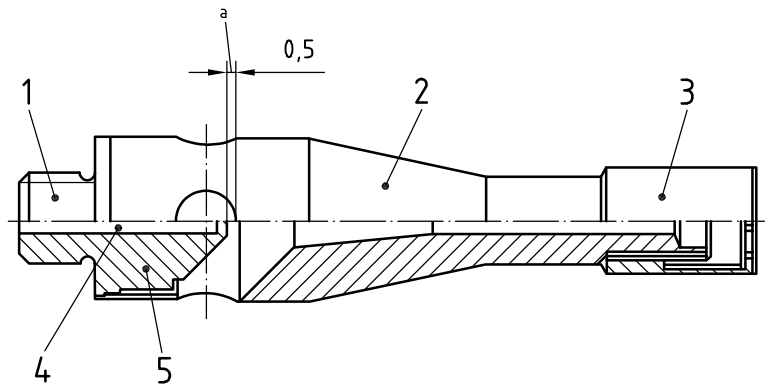
Mark the position through which the pins on the specimen holder must pass by means of the holes in the template (5.4).

NOTE Where the fabric is of open construction (e.g., scrim, gauze), small pieces of adhesive tape may be affixed to the fabric at the pin sites and the position marked on the tape.

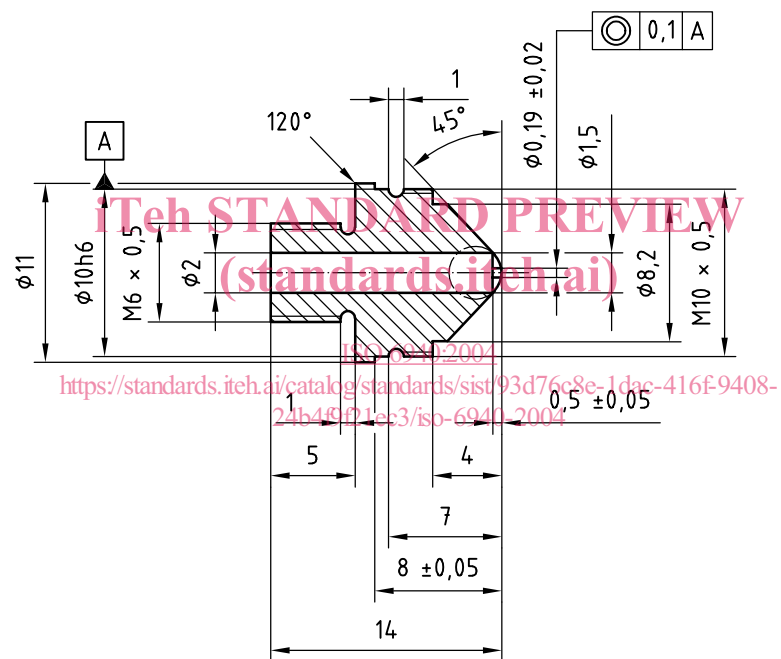
7.3 Test specimen size

Cut out specimens $(200 \text{ mm} \pm 2 \text{ mm}) \times (80 \text{ mm} \pm 2 \text{ mm})$.

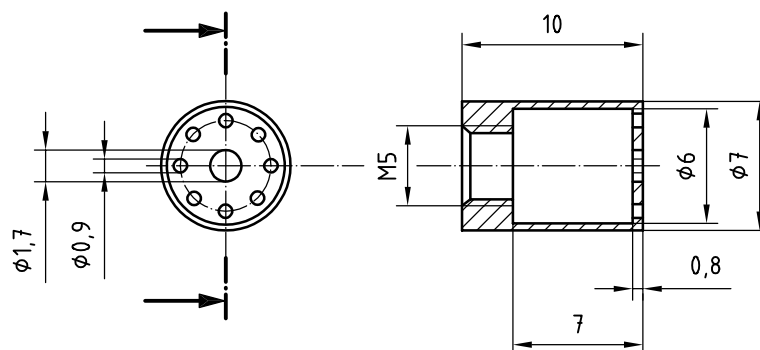
Dimensions in millimetres



a) Gas burner arrangement



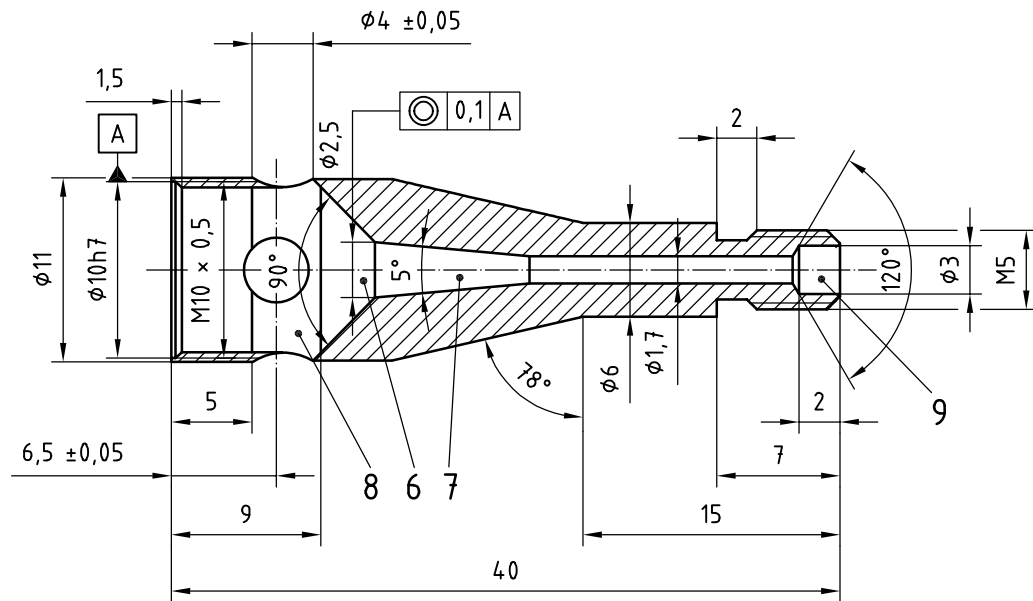
b) Gas jet



c) Flame stabilizer

Figure 1 — Gas burner

Dimensions in millimetres



d) Burner tube

Key

- 1 gas jet
- 2 burner tube
- 3 flame stabilizer
- 4 choke tube
- 5 notch
- 6 gas mixing zone
- 7 diffusion zone
- 8 air chamber
- 9 outlet
- a Fitted during assembly

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Figure 1 — Gas burner (continued)**8 Conditioning and testing atmosphere****8.1 Conditioning**

Unless otherwise specified, test specimens shall be conditioned in an atmosphere having a temperature of $20\text{ °C} \pm 2\text{ °C}$ and a relative humidity of $65\% \pm 5\%$ for at least 24 h. If testing is not carried out immediately after conditioning, place the conditioned test specimens in a sealed container. Testing of each specimen shall begin within 2 min of removing it from either the conditioning atmosphere or the sealed container.

NOTE Care must be taken to avoid injury when mounting the specimens on the pins in the time specified. If necessary, the specimen may be mounted on the specimen holder (5.3) before removal from the conditioning atmosphere.