

---

**Varovalna obleka - Zaščita pred učinki toplote in plamena - Preskusna metoda z omejenim širjenjem plamena**

Protective clothing - Protection against heat and flame - Test method for limited flame spread

Schutzkleidung - Schutz gegen Hitze und Flammen - Prüfverfahren für die begrenzte  
Flammenausbreitung

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

Vêtements de protection - Protection contre la chaleur et les flammes - Méthode d'essai pour la propagation de flamme limitée

[SIST EN 532:1996](#)

<https://standards.iteh.ai/catalog/standards/sist/740314aa-1168-4fa0-a9cb-cb095d2362fa/sist-en-532-1996>

**Ta slovenski standard je istoveten z: EN 532:1994**

---

**ICS:**

13.220.40	Sposobnost vžiga in obnašanje materialov in proizvodov pri gorenju	Ignitability and burning behaviour of materials and products
13.340.10	Varovalna obleka	Protective clothing

**SIST EN 532:1996**

**en**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN 532:1996

<https://standards.iteh.ai/catalog/standards/sist/740314aa-1168-4fa0-a9cb-cb095d2362fa/sist-en-532-1996>

EUROPEAN STANDARD

EN 532

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 1994

ICS 13.340.10

Descriptors: Personal protective equipment, protective clothing, heat protection, work clothing, tests, flame propagation, test atmospheres

English version

## Protective clothing - Protection against heat and flame - Test method for limited flame spread

Vêtements de protection - Protection contre la chaleur et les flammes - Méthode d'essai pour la propagation de flamme limitée  
Schutzkleidung - Schutz gegen Hitze und Flammen - Prüfverfahren für die begrenzte Flammenausbreitung  
(standards.iteh.ai)

SIST EN 532:1996

<https://standards.iteh.ai/catalog/standards/sist/740314aa-1168-4fa0-a9cb-cb095d2362fa/sist-en-532-1996>

This European Standard was approved by CEN on 1994-11-24. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

# CEN

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Page 2  
EN 532:1994

## Foreword

This European Standard has been prepared by the Technical Committee CEN/TC 162 "Protective clothing including hand and arm protection", the secretariat of which is held by DIN.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive(s).

This European Standard shall be given the status of a National Standard, either by publication of an identical text or by endorsement, at the latest by May 1995, and conflicting national standards shall be withdrawn at the latest by May 1995.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 532:1996](https://standards.iteh.ai/catalog/standards/sist/740314aa-1168-4fa0-a9cb-cb095d2362fa/sist-en-532-1996)

<https://standards.iteh.ai/catalog/standards/sist/740314aa-1168-4fa0-a9cb-cb095d2362fa/sist-en-532-1996>

## 0 Introduction

This standard specifies a method of test for limited flame spread of materials intended for flame protective clothing. It contains provisions for testing materials used as single layers (e.g. coveralls) or as multi-layer assemblies (e.g. firefighters' tunics).

The method of test is closely related to the method of test specified in ISO 6941. It uses the same apparatus as ISO 6941 but with a shorter specimen holder and template.

Other changes have been made to the ISO method, following interlaboratory trials by CEN TC162 in which a wide range of flame retardant fabrics used in flame protective clothing were tested using the ISO 6941 apparatus and the smaller specimen size specified in this standard. The principle changes are as follows:

- The specification of face ignition, as being the most appropriate for protective clothing.
- The stipulation of a flame application time of 10 s, as this gives better discrimination than 15 s flame application time and better repeatability than 5 s flame application time.
- The specification of control of flame length in the horizontal position (horizontal reach) as opposed to the vertical flame height, because the flame is used in the horizontal position. The horizontal reach has been found to vary considerably between different burners when set to the same vertical flame height.

Materials which do not burn to the upper or vertical edges of the smaller test specimens used in this test may be classified as producing limited flame spread. Limited flame spread materials are specified for clothing intended for protection against heat and flame hazards, in order to protect against the hazard of the clothing itself burning. The protective properties of the material are not determined by this test method, but they may be determined by other appropriate heat transmission test methods, e.g. EN 366, EN 367 and EN 702.

## 1 Scope

This standard specifies a method of test for determining limited flame spread of textile and textile related materials when a small flame is applied to the surface of vertically oriented specimens.

## 2 Normative references

This European standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

ISO 6940:1984 Textile fabrics - Burning behaviour - Determination of ease of ignition of vertically oriented specimens

ISO 6941:1984 Textile fabrics - Burning behaviour - Measurement of flame spread properties of vertically oriented specimens

Amendment 1:1992 to ISO 6941:1984 Textile fabrics - Burning behaviour - Measurement of flame spread properties of vertically oriented specimens

### 3 Definitions

For the purposes of this standard the following definitions apply:

#### 3.1 Afterflame

Persistence of flaming of material under the specified test conditions, after the ignition source has been removed.

#### 3.2 Afterflame time

The length of time for which a material continues to flame, under the specified test conditions, after the ignition source has been removed (also called duration of flame).

#### 3.3 Afterglow

Persistence of glowing combustion of a material under specified test conditions, after cessation of flaming or, if no flaming occurs, after removal of the ignition source.

NOTE: Afterglow is a continuation of combustion with the evolution of heat and light but without flame. Some materials absorb heat during the flame application and continue to emit this absorbed heat after removal of the igniting flame. This glowing without combustion should not be recorded as afterglow.

#### 3.4 Afterglow time

The time for which a material continues to afterglow, under specified test conditions after cessation of flaming or after removal of the ignition source, ignoring glowing debris.

#### 3.5 Flaming debris

Material separating from the specimen during the test procedure and falling below the initial lower edge of the specimen and continuing to flame as it falls.

#### 3.6 Molten debris

Molten material separating from the specimen during the test procedure and falling from the specimen without flaming.

#### 3.7 Hole

A break in the test specimen at least 5 mm by 5 mm in size caused by melting, glowing or flaming. If the hole is crossed by any material it is described as discontinuous.

#### 3.8 Flame application time

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

#### 3.9 Horizontal reach

The horizontal projection of the igniting flame with the burner in a horizontal position, measured as the distance between the tip of the burner and the extreme end of the yellow part of the flame when viewed in a dim light (see figure 3b).

## 4 Principle

A defined ignition flame from a specified propane gas fuelled burner is applied for 10 s to the surface of a set of at least six vertically oriented test specimens taken from the test sample.

Details of any cleaning or wetting as a pretreatment are specified in the appropriate performance specification.

The occurrence of flame spread to an edge, afterglow, flaming or molten debris, and the formation of a hole are noted. The afterflame time and afterglow time are recorded.

## 5 Health and safety of test operators

Burning of materials may produce smoke and toxic gases which can affect the health of operators. The testing area should be cleared of smoke and fumes by suitable means.

## 6 Conditioning and testing atmospheres

### 6.1 Conditioning

Condition the test specimens for at least 24 h in an atmosphere having a temperature of  $(20 \pm 2) ^\circ\text{C}$  and a relative humidity of  $(65 \pm 5) \%$ . If testing is not carried out immediately after conditioning, place the conditioned test specimens in a sealed container. Begin testing each specimen within 2 min of removing it from either the conditioning atmosphere or the sealed container.

[SIST EN 532:1996](https://standards.iteh.ai/catalog/standards/sist/740314aa-1168-4fa0-a9cb-cb095d2362fa/sist-en-532-1996)

### 6.2 Testing atmosphere

Perform the tests in an atmosphere having a temperature between  $10 ^\circ\text{C}$  and  $30 ^\circ\text{C}$ , a relative humidity between 15 % and 80 %, and air movement less than 0,2 m/s at the commencement of the test of each specimen.

NOTE: Draught shields may be required to restrict air movement in the region of the test flame application.

## 7 Apparatus

NOTE: This apparatus is identical in most respects with that used in ISO 6941, but is modified to use a smaller specimen. It requires a different test specimen holder (see 7.5) and template (see 7.6).

### 7.1 Construction of testing equipment

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

### 7.2 Mounting frame

Mounting frame capable of holding the gas burner and the test specimen holder in the specified relative orientations (see figure 1).

### 7.3 Gas burner

Gas burner having the dimensions given in figure 2. The burner shall be capable of being moved quickly from the standby position, where the tip of the burner is at least 75 mm from the test specimen, to the horizontal operating position described in 8.2 (see figure 1).

### 7.4 Gas

Commercial grade propane gas shall be used.

### 7.5 Test specimen holder

Test specimen holder consisting of a rectangular metal frame having a test specimen support pin of maximum diameter 2 mm and length  $(27 \pm 1)$  mm at each corner of the rectangle of length 190 mm and width 150 mm. Spacer stubs of diameter 2 mm and length  $(20 \pm 1)$  mm are provided adjacent to the test specimen support pins. The distance from the centre of the test specimen support pin to the edge of the frame is 5 mm and the distance from the centre of the specimen support pin to the centre of the adjacent spacer stub is 6 mm (see figure 1).

For materials which do not spread flame sideways the alternative specimen holder No 2 specified in ISO 6940:1984 may be used with specimens 200 mm by 80 mm.

An alternative arrangement of pins and stubs may be used in which the pins,  $(7 \pm 1)$  mm long by a maximum of 2 mm diameter, are mounted into the end of stubs,  $(20 \pm 1)$  mm long by 6 mm maximum diameter, so as to form the corners of a rectangle of 190 mm length and 150 mm width, or 190 mm length by 70 mm width for use with the smaller specimen.

### 7.6 Template

SIST EN 532:1996

<https://standards.iteh.ai/catalog/standards/sist/740314aa-1168-4fa0-a9cb-cb095d23626/sist-en-532-1996>

A flat rigid template of length  $(200 \pm 1)$  mm and width  $(160 \pm 1)$  mm having holes approximately 2 mm in diameter adjacent to each corner positioned so that the centres of the holes correspond to the centres of the test specimen support pins on the test specimen holder (see 7.5), i.e at each corner of a rectangle of length 190 mm and width 150 mm.

A smaller template, 200 mm by 80 mm with holes forming the corners of a rectangle 190 mm by 70 mm, is required for use with the smaller specimen holder No 2 specified in ISO 6940:1984.

### 7.7 Timing devices

A timing device reading to 0,2 s or better is required to measure the flame application time.

At least one timing device reading to 0,2 s or better is required to measure the afterflame time and afterglow time. This device is started, preferably automatically, at the instant of gas burner flame termination or removal, and is stopped manually.

## 8 Setting up the apparatus

### 8.1 Mounting of the test specimen

Place the test specimen (see 9.1) on the pins of the test specimen holder, making certain that the pins pass through the points marked off from the template and that the specimen is  $(20 \pm 1)$  mm away from the rectangular metal frame of the test specimen holder. For multi-layer test specimens, each layer shall be mounted on the pins in the order of use. Fit the test specimen holder to the mounting frame with the specimen vertical.



## 8.2 Operating position of the burner

Position the burner perpendicular to the surface of the test specimen such that the axis of the burner is 20 mm above the line of the lower pins and is aligned with the vertical centreline of the face of the test specimen (see figure 1). Ensure that the tip of the burner is  $(17 \pm 1)$  mm from the surface of the test specimen.

## 8.3 Flame adjustment - Horizontal reach

Set the burner in the vertical standby position (see 7.3 and figure 3a). Light the burner and preheat it for at least 2 min with a flame length of approximately 40 mm. Move the burner into the horizontal standby position (see figure 3b) and adjust the horizontal reach of the flame to  $(25 \pm 2)$  mm.

NOTE: If the apparatus does not have a horizontal standby position it will be necessary to remove the test specimen before carrying out the flame adjustment.

## 8.4 Flame position

Move the burner from the standby position to the horizontal operating position (see 8.2). Confirm that the flame impinges on the test specimen in the correct location (see figure 3c).

NOTE: The flame reach should be checked regularly.

## 9 Procedure and sampling

### 9.1 Sampling

[SIST EN 532:1996](https://standards.iteh.ai/catalog/standards/sist/740314aa-1168-4fa0-a9cb-cb095d2362fa/sist-en-532-1996)

<https://standards.iteh.ai/catalog/standards/sist/740314aa-1168-4fa0-a9cb-cb095d2362fa/sist-en-532-1996>

#### 9.1.1 Single layer test specimens

Mark out a set of six test specimens  $(200 \pm 1)$  mm long by  $(160 \pm 1)$  mm wide, three with the longer dimension in the length direction of the material and three with the longer dimension in the width direction. Use the template (7.6) to mark the position of the specimen holder pins. Condition the test specimens in accordance with 6.1.

NOTE: An extra test specimen is required for the setting up procedure (see clause 8).

#### 9.1.2 Multi-layer test specimens

Mark out a set of six test specimens  $(200 \pm 1)$  mm long by  $(160 \pm 1)$  mm wide, three with the longer direction in the length direction of the material and three with the longer dimension in the width direction. Each test specimen shall consist of all the layers in the clothing assembly to be tested, arranged in the order as used. Use the template (7.6) to mark the position of the specimen holder pins on each layer. Condition the test specimens in accordance with 6.1.

NOTE: An extra test specimen is required for the setting up procedure (see clause 8).

## 9.2 Procedure

9.2.1 Set up the apparatus as described in clause 8.

9.2.2 Position a test specimen on the test specimen holder as described in 8.1.

Apply the igniting flame for 10 s.