SLOVENSKI STANDARD
SIST EN 3844-1:2019

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Nadomešča:
SIST EN 3844-1:2012

Aeronavtika - Vnetljivost nekovinskih materialov - 1. del: Preskus majhnih gorilnikov, navpični - Ugotavljanje navpičnega širjenja ognja

Aerospace series - Flammability of non metallic materials - Part 1: Small burner test, vertical - Determination of the vertical flame propagation

Luft- und Raumfahrt - Entflammbarkeit nichtmetallischer Werkstoffe - Teil 1: Kleinbrenner-Prüfung, senkrecht - Bestimmung der senkrechten Flammenausbreitung

Série aérospatiale - Inflammabilité des matériaux non métalliques - Partie 1 : Essai au brûleur, vertical - Détermination de la propagation verticale de la flamme

Ta slovenski standard je istoveten z: EN 3844-1:2019

ICS:

13.220.40	Sposobnost vžiga in obnašanje materialov in proizvodov pri gorenju	Ignitability and burning behaviour of materials and products
49.025.15	Neželezove zlitine na splošno	Non-ferrous alloys in general

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EUROPEAN STANDARD

NORME EUROPÉENNE

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EN 3844-1

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ICS 49.025.15

Supersedes EN 3844-1:2011

English Version

Aerospace series - Flammability of non-metallic materials - Part 1: Small burner test, vertical - Determination of the vertical flame propagation

Série aérospatiale - Inflammabilité des matériaux non métalliques - Partie 1 : Essai au brûleur, vertical - Détermination de la propagation verticale de la flamme

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This European Standard was approved by CEN on 12 May 2019.

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 CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists 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 CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 3844-1:2019) has been prepared by the Aerospace and Defence Industries Association of Europe — Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

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 February 2020, and conflicting national standards shall be withdrawn at the latest by February 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 3844-1:2011.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document specifies the test method for the determination of the vertical flame propagation and after flame time of non-metallic materials in part or in whole.

This test method is also used for testing non-metallic materials which have to meet the test criteria for the vertical Bunsen burner test:

a) with a flame application time of 60 s;

b) with a flame application time of 12 s.

It is used for evaluation of non-metallic materials or constructions used in the interiors of aerospace vehicles but also may be used in other applications as specified in applicable procurement and regulatory documents.

This standard should be used to measure and describe the properties of non-metallic materials, products or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use.

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.

ASTM-D 5025, *Standard Specification for Laboratory Burner Used for Small-Scale Burning Tests on Plastic Materials* 1)

3 Terms and definitions

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

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

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

3.1
time of flame application
length of time for which the burner flame is applied to the specimen

3.2
after flame time
time in seconds for which the specimen continues to flame after the burner flame has been removed from the specimen

1) Published by: ASTM National (US) American Society for Testing and Materials http://www.astm.org/.

Note 1 to entry: The time is expressed in seconds.

3.3
after flame time of drips
time in seconds that any flaming material continues to flame after falling from the specimen to the bottom of the chamber

Note 1 to entry: If there is more than one drip, the after flame time of drips reported is that of the longest flaming drip. If succeeding flaming drips reignite earlier drips that flamed, the after flame time of drips reported is the total of all flaming drips.

Note 2 to entry: The time is expressed in seconds.

3.4
burn length
distance in millimetres from the original specimen edge to the farthest evidence of damage of the test specimen due to that area's combustion, including areas of partial consumption, charring, or embrittlement, but not including areas sooted, stained, warped or discoloured, nor areas where material has shrunk or melted away from the heat

Note 1 to entry: The distance is expressed in millimetres.

4 Principle of method

Testing is performed on a specimen that is held vertical. A burner flame, having defined parameters, is applied to the specimen for a defined period of time. The after flame time and the burn length is measured. The occurrence of drips and their after flame time is measured.

5 Designation

EXAMPLE

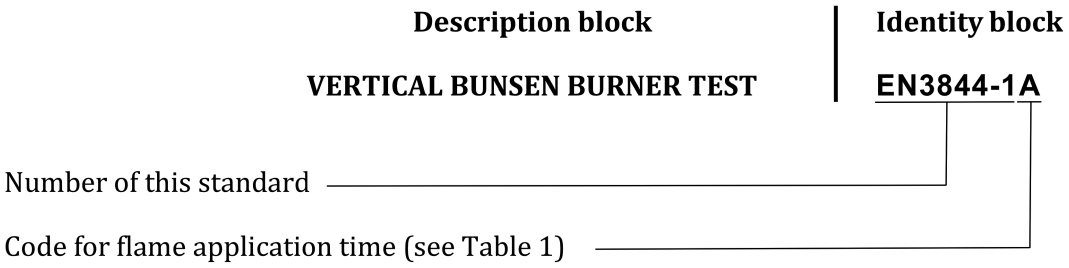

Table 1

Time of flame application s	Code
60	A
12	B

6 Test apparatus

6.1 Test cabinet

Tests shall be conducted in a draught-free cabinet, like shown in Figure 1 or other equivalent enclosures. Details and dimensions of a suitable test cabinet are given in Figure 2.

Cabinets of bigger dimensions may be used if it has been proven that similar results are obtained.

1 mm thick metal sheet shall be used for the bottom surface of the cabinet.

It is recommended to paint the entire inside back wall of the cabinet mat black to facilitate the viewing of the test specimen. A mirror may be located on the inside back surface to facilitate observation of the hidden surface.

It is suggested that the cabinet be located inside an exhaust hood to facilitate clearing the cabinet of smoke and fumes after each test.

6.2 Specimen holder

A specimen holder shall be provided, such that the exposed area of at least the specimen is 50 mm × 305 mm. An example for a construction is given in Figure 3.

The specimen holder shall be fabricated of corrosion-resistant metal.

A comb can be used for testing of small items, which cannot be mounted in the specimen holder, see Figure 4.

6.3 Burner

6.3.1 Burner type

The burner shall be a Bunsen or Tirril type, have a 9,5 mm inside diameter barrel, and shall be equipped with a needle valve to adjust the gas flow rate and thereby adjust the flame height.

The burner shall have no air supplied either directly or by aspiration. The Bunsen burner defined in ASTM-D 5025 has been found acceptable.

6.3.2 Burner type

Methane gas shall be used as burner fuel. Natural gas is also acceptable if it contains more than 90 % methane.

6.3.3 Plumbing for gas supply

The necessary gas connections and the applicable plumbing are shown in Figure 5. A control valve system with a delivery rate designed to furnish gas to the burner under a pressure of (17 ± 2) kPa at the burner inlet shall be installed between the gas supply and the burner.

6.3.4 Flame height indicator

A flame indicator shall be used. A suitable indicator is shown in Figure 6. The indicator shall have two height indicators, e.g. prongs marking the distances 22 mm and 38 mm above the top of the burner. When the flame is properly adjusted, then the tip of the flame shall be at the 38 mm prong and for pure

methane the tip of the inner cone of the flame will be at the 22 mm prong. The flame height indicator may be removable.

6.3.5 Flame temperature

When the height is adjusted, measure the flame temperature with the help of a calibrated temperature measurement device and an allocated thermocouple (Type K, Ø 1,5 mm). The tip of the thermocouple shall be completely in the flame. The flame temperature shall be at least 843 °C.

6.4 Timer

One or more stop-watches or other timers, calibrated and graduated to the nearest 0,1 s, shall be used to measure the time of the flame application, the after flame time and the after flame time of drips.

6.5 Ruler

A ruler or a scale, calibrated and graduated to the nearest 1 mm, shall be used to measure the burn length.

7 Test specimens

7.1 Number of specimens

At least three specimens shall be prepared and tested.

7.2 Specimens orientation

For materials which may have anisotropic flammability properties (i.e. different properties in different directions, such as machine and cross-machine direction for extruded materials, warp and weft for woven fabrics, etc.), the specimens shall be tested in both directions.

The values for every direction have to be averaged and reported separately.

7.3 Specimens size

The specimens shall be a rectangle of at least 75 mm × 305 mm, unless the actual size used in the aircraft is smaller. If the part construction is used in several thicknesses, the minimum thickness will be tested. Foam parts that are thicker than 13 mm, such as seat cushions, will be tested in 13 mm thicknesses.

8 Conditioning

Condition specimens at (23 ± 2) °C and at (50 ± 5) % relative humidity for min. 24 h. Remove only one specimen at a time from the conditioning environment immediately before being tested.

9 Burner adjustment

a) Assure that the air supply to the burner is shut off.

b) Open the stopcock in the gas line fully.

c) Light the burner.

d) Adjust the gas flowrate to produce a flame height of 38 mm.

10 Test procedure

Make sure that the test cabinet is essentially draught free.

Place the burner at least 76 mm away from the test position.

Mount the specimen into the specimen holder so that the clamped edges are held securely. One short edge of the specimen has to be flush with the open end of the specimen holder.

Insert the specimen holder into the cabinet and assure that the vertical distance between the burner orifice and the bottom surface of the specimen is 19 mm (see Figure 7).

Make sure of the verticality of the specimen.

Close the cabinet door, and keep it closed during the test.

Place the burner in test position.

Start the timer as soon as the burner is in test position.

If not otherwise defined in the customer's specification the test position is defined as follows:

The burner is positioned under the specimen such that the flame impinges on the midpoint of the lower edge of the test side, defined in the test specification (see Figure 7).

Depending on the customer's specification apply the flame for 12 s or 60 s and then withdraw it by moving the burner at least 76 mm away from the test position.

If flaming material falls from the test specimen, record the after flame time of drips for the specimen to the nearest 1 s.

Determine the after flame time for the specimen to the nearest 1 s.

After all flaming and glowing have ceased, open the cabinet door slowly to clear the test cabinet of fumes and smoke.

Remove the specimen and determine the burn length to the nearest 1 mm.

For specimens that are 19 mm thick or less, place the burner barrel centreline under the centre of the bottom surface of the specimen. For specimens thicker than 19 mm, centre the burner barrel under the bottom surface of the specimen 10 mm from the surface exposed to the airplane interior, test each surface separately unless the surfaces are of the same materials and construction.

To facilitate determining the burn length, a moderate solvent that does not dissolve or attack the specimen material may be used to remove soot and stained particles from tested specimen.

In some cases it might be helpful to cut the specimen in order to determine the burn length.

Remove any material from the bottom of the cabinet that fell from the specimen. If necessary, clean the test cabinet window prior to testing the next specimen.

11 Test report

The test report shall include the following data:

a) description of the specimen;

b) manufacturer/supplier;

c) designation of the test method;

d) burn length for each specimen tested and the average value;

e) after flame time for each specimen tested and the average value;

f) after flame time of drips for each specimen tested and the average value.

NOTE If no material falls from the specimen, the after flame time of drips is 0 s, and "No drip" is also reported.

If there is more than one drip, the after flame time of drips reported is that of the longest flaming drip. If succeeding flaming drips reignite drips that flamed earlier, the after flame time of drips reported is the total of all flaming drips.

g) specimen orientation (if applicable);

h) observations about melting, sagging, delamination, or other behaviour that affected the exposed surface area or mode of burning occurred, and the time in seconds at which such behaviour occurred;

i) changes in test procedure required by the test specification;

j) name and address of the test laboratory/organization;

k) date of testing;

l) operator's name and signature.