SLOVENSKI STANDARD
SIST EN 2825:2011

01-november-2011

Aeronavtika - Gorljivost nekovinskih materialov zaradi žarčenja toplote in plamena - Ugotavljanje gostote dima

Aerospace series - Burning behaviour of non metallic materials under the influence of radiating heat and flames - Determination of smoke density

Luft- und Raumfahrt - Brandverhalten nicht metallischer Werkstoffe unter Einwirkung von strahlender Wärme und Flammen - Bestimmung der Rauchdichte

Série aérospatiale - Comportement au feu des matériaux non métalliques sous l'action de chaleur rayonnante et de flammes - Détermination de la densité de fumée

Ta slovenski standard je istoveten z: **EN 2825:2011**

ICS:

13.220.40	Sposobnost vžiga in obnašanje materialov in proizvodov pri gorenju	Ignitability and burning behaviour of materials and products
49.025.01	Materiali za letalsko in vesoljsko gradnjo na splošno	Materials for aerospace construction in general

SIST EN 2825:2011 **en,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 2825

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ICS 13.220.40; 49.025.99

English Version

Aerospace series - Burning behaviour of non metallic materials under the influence of radiating heat and flames - Determination of smoke density

Série aérospatiale - Comportement au feu des matériaux non métalliques sous l'action de chaleur rayonnante et de flammes - Détermination de la densité de fumée

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This European Standard was approved by CEN on 17 December 2010.

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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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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 2825:2011) 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 October 2011, and conflicting national standards shall be withdrawn at the latest by October 2011.

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

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard defines a test method for determination of the smoke density due to pyrolitic decomposition of solid materials and composite materials of up to 25 mm in thickness under the influence of radiant heat only or with simultaneous flame application.

The test results enable a comparison of the smoke production of different materials or material configurations under the conditions specified in this standard.

NOTE 1 The smoke gas density is determined according to the specific environmental and test conditions defined in EN 2824 and this standard. No studies have been made up to now to determine whether the results can be transferred to differing conditions, particularly to actual fire conditions.

NOTE 2 The burning behaviour - and consequently the smoke density - of aerospace materials are not only influenced by the type of material but also to a large extent by the configuration, the specific surface and mass, the combination with other materials, the means of joining as well as the processing technique.

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.

EN 2824, *Aerospace series — Burning behaviour of non metallic materials under the influence of radiating heat and flames — Determination of smoke density and gas components in the smoke of materials — Test equipment apparatus and media* [1)]

EN ISO 13943:2008, *Fire safety — Vocabulary*

3 Short description of the test method

The specimens are vertically arranged in a closed test chamber according to EN 2824 and subjected to decomposition by radiant heat only or with flame application. The smoke density is measured by means of the reduction of light transmission as smoke accumulates and expressed in terms of specific optical density which is derived from a geometric factor and the measured light obscuration.

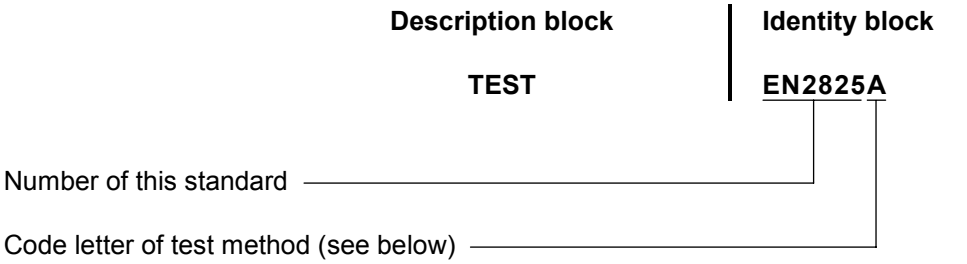
4 Terms and definitions

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

1) Published as ASD-STAN Prestandard at the date of publication of this standard by Aerospace and Defence Industries Association of Europe-Standardization (ASD-STAN), (www.asd-stan.org).

5 Designation

EXAMPLE



A = indicates that the method is used to test a material in the Flaming mode only.
B = indicates that the method is used to test a material in both the Flaming mode and the Norm-Flaming mode.

6 Test equipment

Testing shall be carried out in a test chamber according to EN 2824.

7 Specimens

7.1 Number of specimens

According to EN 2824.

7.2 Conditioning

According to EN 2824.

7.3 Dimensions and shape of specimens

According to EN 2824.

7.4 Specimen mounting

According to EN 2824.

8 Procedure

8.1 When performing the test, precautions shall be taken to remove potentially hazardous gases from the area of operation.

8.2 During the warm-up period, all electric systems (furnace, light source, photometer-readout) shall be switched on, the exhaust vent and chamber door shall be closed and the inlet vent be open. When the temperature on the centre surface of the back wall has reached a steady-state value of (35 ± 2) °C, the chamber is ready for calibrating or testing. To increase the chamber wall surface temperature to the stated level, an auxiliary heater may be used, but shall be removed prior to performing tests. Conversely, to decrease this temperature, the exhaust blower may be used to introduce cooler air. The furnace shall be calibrated at periodic intervals.

8.3 A specimen holder with inserted calcium silicate sheet shall always be located directly in front of the furnace, except when it is replaced by the specimen holder during a test or the radiometer during calibration. It shall be returned immediately to this position when testing or calibration is completed to prevent excessive heating of the opposite wall surface.

8.4 During the daily calibration, the radiometer shall be placed on the horizontal rods of the furnace support framework and accurately positioned in front of the furnace opening by displacing the "blank" specimen holder against the prepositioned stop. With the chamber door closed and the inlet vent opened, the compressed air supply to the radiometer cooler shall be adjusted to maintain the radiometer body temperature at (93 ± 3) °C.

After the system has reached steady-state the furnace transformer shall be adjusted to obtain - as per radiometer calibrating curve - an output signal corresponding to an irradiance of (25,0 ± 0,5) kW/m^2 averaged over the radiometer receiver area. After the prescribed irradiance level has reached steady-state, the radiometer shall be removed from the chamber and replaced by the "blank" specimen holder. A suitable voltmeter or recorder shall indicate the radiometer signal.

The calibration of the radiometer has to be checked regulary because the characteristics may change by use.

The whole system has to be verified finally by testing standardized samples or by comparative testing.

8.5 After the system has reached steady-state (end of warm-up period), the amplifier sensitivity shall be adjusted to obtain a 100 % transmittance indication in the least sensitive measuring range with free light path. The "dark current" reading shall be set to zero by compensating the dark current with the light beam blocked in the most sensitive measuring range of the photometer to 0 % transmittance. Prior to commencing the test the zero line of the recorder shall be adjusted accordingly.

8.6 For non-flaming exposures the burner shall be removed. For flaming exposures the burner shall be positioned in front of the lower edge of the specimen, as described in 8.3 and Figure 8 of EN 2824. The burner distances relative to the blank specimen holders shall be checked prior to testing.

8.7 Before accurately positioning the specimen in front of the furnace, the chamber shall be flushed for about 2 min with the door and exhaust and inlet vents open. The wall temperature, measured with the back wall thermocouple according to EN 2824, shall be verified when starting the test (see 8.2).

8.8 The exhaust vent and blower shall be closed. The loaded specimen holder shall be placed on the bar support and pushed into position in front of the furnace by displacing the blank holder to the stop. The chamber door shall be closed quickly, starting simultaneously the recorder or plotter. The inlet vent shall only be completely closed when the photometer indicates the presence of smoke.

8.9 The light transmittance and the corresponding time shall recorded as a continuous plot. The necessary full-scale range changes shall be made and noted in decade steps.

The percentage error of a reading becomes progressively worse at the lower portion of the scale. Avoid light transmittance measurement on scale readings less than 10 by making the appropriate decade range change.

8.10 The increase in chamber pressure shall be observed using the manometer described in EN 2824. If negative pressure develops after very intense burning of specimen, the inlet vent shall be slightly opened for pressure equalization.

During the test, the gas flow of the burner shall be kept constant.

8.11 Unless otherwise specified, the test duration shall be 6 min.

8.12 If transmittance falls below 0,01 %, the chamber window shall be covered with an opaque screen to avoid possible light-scattering effects from room light. The ND-2 filter in the photometric system according to EN 2824, Figure 5, shall be removed from the light path to extend the measuring range. The filter shall be replaced before exhausting smoke from the chamber.

8.13 Within 1 min after termination of the test, the specimen shall be displaced from the front of the furnace by pushing the blank specimen holder with the positioning rod and exhausting of the chamber be started. Continue to exhaust with the inlet vent open until maximum transmittance is reached. This transmittance value shall be recorded.

9 Calculation of test results

The specific optical density D_s shall be calculated to the following formula:

$$D_s = G \cdot \log_{10} \cdot \frac{100}{T_t}$$

where

D_s is the specific optical density;

T_t is the percent light transmission at the time, in minutes;

G is a geometric factor (see below).

$$G = \frac{V}{A \cdot L} \qquad \text{here } G = \frac{(91{,}4 \times 91{,}4 \times 61)\,\text{cm}}{(6{,}5 \times 6{,}5 \times 91{,}4)\,\text{cm}} = 132$$

where

V is the chamber volume in cubic centimetres;

A is the exposed specimen surface area, in square centimetres;

L is the light path length, in centimetres.

The arithmetic mean for the smoke density D_s shall be calculated in each case from the individual values measured.

For very high D_s values the ND-2 filter shall be removed and then a correction factor shall be added to the calculation.

10 Test report

The test report (see Annex A) shall include the following:

10.1 Complete description of the specimen material and the specimen construction (material designation, manufacturer's identification, manufacturer/supplier, manufacturing batch number, order number, construction, specimen thickness, density etc.).

10.2 Period and conditions of specimen conditioning.

10.3 Test conditions (with or without flame application).

10.4 Number of tests performed.

10.5 Tabulation of individual results after 1 min, 1,5 min and 2 min and in 1 min intervals (up to 6 min).

10.6 Observations concerning smoke generation, such as colour of the smoke, nature of soot deposits etc.

10.7 Date of testing.

10.8 Signature.