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

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

Luft- und Raumfahrt - Brandverhalten nicht metallicher Werkstoffe unter Einwirkung von strahlender Wärme und Flammen - Bestimmung von Rauchgaskomponenten

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

[https://standards.iteh.ai/catalog/standards/sist/c993a944-9427-4048-8403-](https://standards.iteh.ai/catalog/standards/sist/c993a944-9427-4048-8403-d63d808a3cbf/sist-en-2826-2011)

Ta slovenski standard je istoveten z: EN 2826:2011

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 2826:2011**en,de**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 2826:2011

<https://standards.iteh.ai/catalog/standards/sist/c993a944-9427-4048-8403-d63d808a3cbf/sist-en-2826-2011>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 2826

February 2011

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 gas components in the smoke**

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

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

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

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.

CEN members are the national standards bodies of 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 United Kingdom.



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

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword.....	3
1 Scope	4
2 Normative references	4
3 Short description of the test method.....	4
4 Terms and definitions	5
5 Designation	5
6 Test equipment	5
7 Specimens	5
7.1 Number of specimens	5
7.2 Conditioning.....	5
7.3 Dimensions and shape of specimens	5
7.4 Specimen mounting.....	5
8 Procedure	5
9 Gas sampling and analysis.....	6
9.1 General.....	6
9.2 Sampling by means of plastic bags.....	6
9.3 Alternative sampling methods	6
9.4 Direct sampling using a dosing pump.....	6
9.5 Handling of colorimetric tubes.....	6
9.6 Determination of halogens.....	7
9.6.1 Hydrogen chloride (using colorimetric tubes).....	7
9.6.2 Hydrogen fluoride and hydrogen chloride (potentiometric measurement; wet analysis)	7
9.7 Determination of other gases	8
9.8 After the test.....	8
9.9 Sources of errors	8
10 Test report	8
Annex A (normative) Example for a test report on the determination of gas components in the smoke.....	9

Foreword

This document (EN 2826:2011) 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 August 2011, and conflicting national standards shall be withdrawn at the latest by August 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.

ITEH STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 2826:2011

<https://standards.iteh.ai/catalog/standards/sist/c993a944-9427-4048-8403-d63d808a3cbf/sist-en-2826-2011>

EN 2826:2011 (E)

1 Scope

This European Standard defines a test method to determine the concentration of certain gas components due to pyrolytic decomposition of solid materials and composite materials under the influence of radiant heat only or with simultaneous flame application.

NOTE 1 The gas components in the smoke are 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 different conditions, particularly to actual fire conditions. The inhalatory toxic risk and irritancy affect cannot be assessed by merely measuring the concentration of individual gas components in the smoke.

NOTE 2 The burning behaviour and consequently the gas components in the smoke 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.

NOTE 3 These influences shall be taken into account in the preparation of tests, the selection of test specimens and the interpretation of test results.

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 2825, *Aerospace series — Burning behaviour of non-metallic materials under the influence of radiating heat and flames — Determination of smoke density*

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

3 Short description of the test method

3.1 General

The specimens are vertically arranged in a closed test chamber according to EN 2824 and subjected to decomposition by radiant heat with or without flame application. During the test, gas samples are taken at specified intervals from the generated decomposition products to determine the concentration of selected components.

The methods described in 3.2 and 3.4 are used to determine the gas components in the smoke.

3.2 The hydrogen chloride (HCl) taken from the test chamber can be indicated directly during the test using colorimetric tubes or analyzed by wet analysis.

3.3 Hydrogen fluoride (HF) is measured by wet analysis.

3.4 For determination of other gases, the fumes are collected in a plastic bag with a high gas-isolation value; they can be measured consecutively using colorimetric tubes.

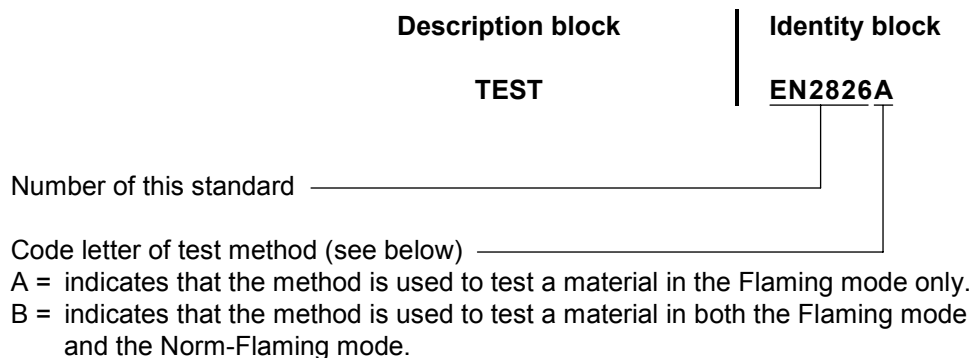
¹⁾ Published as ASD-STAN Prestandard at the date of publication of this standard by Aerospace and Defence Industries Association of Europe-Standardization (ASD-STAN), (www.asd-stan.org).

4 Terms and definitions

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

5 Designation

EXAMPLE



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

The specimens conditioned according to EN 2824 are tested in line with the requirements of EN 2825, Clause 8; gas samples are taken according to Clauses 8 and 10. Testing may be carried out concurrently to the determination of the smoke density according to EN 2825. When the specimens are being examined for gas components in the smoke only, the requirements specified for the adjustment of the optical system are not applicable.

EN 2826:2011 (E)

9 Gas sampling and analysis

9.1 General

The gas-sampling test set-up shall conform to EN 2824, Figure 9.

Unless otherwise specified, gas sampling shall be started at 4 min. If gas samples are taken during the measurement of smoke, the smoke measurement values may be affected.

The point of time indicated for the measurement means the beginning of the measurement, i. e. of the gas sampling. If the sampling period exceeds 40 s, this shall be noted separately in the test report.

9.2 Sampling by means of plastic bags

The sampling by means of plastic bags shall be carried out according to EN 2824, Figure 9.

Before starting the test, the sampling bag shall be evacuated.

The bag is introduced into the vacuum chamber and then connected to the quick release coupling on the cover. The shut-off valve on the bag is opened and the tubing between test chamber and plastic sampling bag is evacuated. Then the vacuum chamber is evacuated to a pressure of 500 hPa.

The sample is introduced into the test chamber and tested according to EN 2825. The chamber shut-off valve and the valve of the vacuum chamber are opened at the time required for starting the gas measurement. After filling of the bag, both supply line valves shall be closed. The vacuum chamber shall be ventilated by means of valve 2²⁾. The shut-off valve 4²⁾ near the gas bag is closed, the bag is closed and disconnected from the cover. The measuring of the gases contained in the plastic bag shall be carried out within 5 h. The measurement of SO₂ shall be carried out within 5 min after the end of the sampling procedure.

9.3 Alternative sampling methods

Alternatively, to the sampling method of filling the bag in a vacuum chamber, other methods may also be appropriate, e.g. filling a sampling bag by a suitable pump.

9.4 Direct sampling using a dosing pump

Sampling to measure hydrogen chloride using colorimetric tubes is affected during the test directly from the test chamber by a dosing pump to EN 2824, 3.15.

The sampling system and the dosing pump shall be checked for leakages.

9.5 Handling of colorimetric tubes

For handling and/or preparation of the test tubes, the instructions of the manufacturer shall be observed.

2) See EN 2824, Figure 9.

9.6 Determination of halogens

9.6.1 Hydrogen chloride (using colorimetric tubes)

Immediately before starting the test, the prepared HCl test tube shall be fixed in the support of the probe in the test chamber. At the specified time after start of the test, the supply line to the gas pump shall be opened by shut-off valve and the gas pump shall be switched on. The duration of the pumping operation shall be noted.

9.6.2 Hydrogen fluoride and hydrogen chloride (potentiometric measurement; wet analysis)

9.6.2.1 Measuring method

The quantity of fluoride and chloride is measured by means of an ion specific fluoride or chloride electrode as indicator electrode and a reference electrode (e.g. silver chloride). The corresponding HF or HCl concentration is determined by means of a calibration curve. In order to plot this curve the electrode potentials of some NaF or NaCl buffer solutions with different molarity are determined and plotted in a calibration curve.

NOTE 1 When measuring HCl, the presence of sulphur may influence the test results. In this case, $\text{Ni}(\text{NO}_3)_2$ shall be added to the test solution. Care shall be taken to maintain a pH value < 3 . Moreover, the electrode shall be recalibrated in the presence of $\text{Ni}(\text{NO}_3)_2$.

NOTE 2 The presence of bromide, too, substantially influences the measuring of HCl. If the material under test is suspected of containing bromide, this shall be verified by means of other measuring methods (e.g. ion chromatography).

NOTE 3 Products containing large quantities of HCN, NO, and NO_2 , can affect the amount of HCl measured. It is therefore necessary to adjust the solution to a pH value of 3.

9.6.2.2 Procedure

The test set-up shall conform to EN 2824. [SIST EN 2826:2011
https://standards.iteh.ai/catalog/standards/sist/c993a944-9427-4048-8403-d63d808a3cbf/sist-en-2826-2011](https://standards.iteh.ai/catalog/standards/sist/c993a944-9427-4048-8403-d63d808a3cbf/sist-en-2826-2011)

A scrubber according to EN 2824 is filled with 10 ml 0,1 molarity CH_3COONa , which has been adjusted to pH6, using glacial acetic acid. 1000 cm^3 of the combustion gas to be tested are passed through this liquid at a flow rate of (400 ± 50) ml/min. The scrubber location in the test chamber shall conform to EN 2824. The content of the scrubber is put into a 50 ml measuring flask and completed with distilled water, ionic strength adjuster and a buffer solution suitable to bind potentially existing metal ions [e.g. a complexing agent such as 1,2 cyclohexylene-dinitrilotetra-acetic acid (monohydrate)] up to the measuring mark.

9.6.2.3 Calculation

The HF or HCl concentration in V_{ppm} is calculated as follows:

$$V_{\text{ppm}}(\text{HF}) = \frac{\text{HF (molarity)} \times V (500 \text{ ml}) \times 22,4 \times 10^6}{\text{Quantity of absorbed combustion gas (1 000 cm}^3\text{)}}$$

where

V_{ppm}	is the gas concentration in parts, per million;
HF (molarity)	is the concentration of HF in molecular weight, per litres;
V	is the volume of measuring flask, in millilitres, here 50 ml.

The HF molarity (mol/l) is determined by inserting the mV readout in the calibration curve.