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**Splošne metode za preskušanje kablov v požarnih razmerah - Ugotavljanje nastajanja plinov pri gorenju kabelskih materialov - 2-1. del: Postopki - Ugotavljanje količine plina halogenske kisline**

Common test methods for cables under fire conditions - Tests on gases evolved during combustion of materials from cables - Part 2-1: Procedures - Determination of the amount of halogen acid gas

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Allgemeine Prüfverfahren für das Verhalten von Kabeln und isolierten Leitungen im Brandfall - Prüfung der bei der Verbrennung der Werkstoffe von Kabeln und isolierten Leitungen entstehenden Gase - Teil 2-1: Prüfverfahren - Bestimmung des Gehaltes an Halogenwasserstoffsäure

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Méthodes d'essai communes aux câbles soumis au feu - Essais sur les gaz émis lors de la combustion d'un matériau prélevé sur un câble - Partie 2-1: Procédures - Détermination de la quantité de gaz acides halogénés

**Ta slovenski standard je istoveten z: EN 50267-2-1:1998**

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**ICS:**

13.220.40	Sposobnost vžiga in obnašanje materialov in proizvodov pri gorenju	Ignitability and burning behaviour of materials and products
29.060.20	Kabli	Cables

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EUROPEAN STANDARD

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ICS 13.220.40; 29.060.20

Descriptors: Electrical installation, electrical cables, fire tests, combustion tests, combustion products, burning gases, corrosive gases, determination, acidity, corrosivity, testing conditions, procedure

English version

**Common test methods for cables under fire conditions**  
**Tests on gases evolved during combustion of materials from cables**  
**Part 2-1: Procedures - Determination of the amount of halogen acid gas**

Méthodes d'essai communes aux câbles soumis au feu - Essais sur les gaz émis lors de la combustion d'un matériau prélevé sur un câble  
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Allgemeine Prüfverfahren für das Verhalten von Kabeln und isolierten Leitungen im Brandfall - Prüfung der bei der Verbrennung der Werkstoffe von Kabeln und isolierten Leitungen entstehenden Gase  
Teil 2-1: Prüfverfahren - Bestimmung des Gehaltes an Halogenwasserstoffsäure

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**CENELEC**

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
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## FOREWORD

This European Standard was prepared by the Technical Committee CENELEC TC20, Electric Cables.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50267-2-1 on 1998-04-01.

The following dates were fixed:

- latest date by which the EN has to be implemented  
at national level by publication of an identical  
national standard or by endorsement (dop) 1999-03-01
- latest date by which national standards conflicting  
with the EN have to be withdrawn (dow) 2000-03-01

Annexes designated "normative" are part of the body of the standard. Annexes designated "informative" are given for information only. In this standard annex A is informative. There is no normative annex.

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## 1. Scope

EN 50267-2-1 specifies the procedure for the determination of the amount of halogen acid gas, other than hydrofluoric acid, evolved during the combustion of compounds based on halogenated polymers, and compounds containing halogenated additives, taken from cable constructions.

For reasons of accuracy this method is not recommended for use where the amount of halogen acid evolved is less than 5 mg/g of the sample taken.

This method is not suitable for defining compounds or materials described as 'zero-halogen' or 'halogen-free'. For such compounds or materials, and all compounds or materials containing less than 5 mg/g halogen acid equivalent, it is recommended to use the method specified in EN 50267-2-2.

## 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.

EN 50267-1: Common test methods for cables under fire conditions. Tests on gases evolved during the combustion of materials from cables. Part 1: Apparatus.

EN 60695-4: Fire hazard testing : Part 4 : Terminology concerning fire test.

Note: IEC 60695 is in the course of re-numbering its Parts and Sections. This will also affect the equivalent ENs.

## 3. Definition

[SIST EN 50267-2-1:1999](https://standards.iteh.ai/catalog/standards/sist/60ba3f6a-5596-4cf5-98fa-147c6204fd22/sist-en-50267-2-1-1998)

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For the purposes of EN 50267-2-1 the following definition applies. The definition is taken from EN 60695-4.

3.1 **Combustion:** Exothermic reaction of a substance with an oxidizer with emission of effluent, generally accompanied by flames and/or glowing and/or emission of smoke.

## 4. Test apparatus

The apparatus used shall be that specified in EN 50267-1.

## 5. Procedure

### 5.1 General principle

The material under test is heated in a stream of dry air and the gases absorbed in 0,1 M sodium hydroxide solution contained in wash bottles. Each wash bottle shall contain at least 220 ml of 0,1 M sodium hydroxide solution. The amount of halogen acid is then determined by acidifying the solution with nitric acid adding a measured volume of 0,1 M silver nitrate solution and back titrating the excess with 0,1 M ammonium thiocyanate using ferric ammonium sulphate as the indicator, or any other equivalent analytical method having at least the same accuracy.

Duplicate tests shall be carried out on the sample of material, and a blank determination shall be carried out without the sample.

The result shall be taken as the mean of the two determinations. The individual values shall not vary by more than  $\pm 10\%$  from the mean.

### 5.2 Samples

A sample shall consist of 500 mg to 1000 mg of the material to be tested. Each sample shall be taken from samples representative of the material. The sample shall be cut into small pieces.

### 5.3 Conditioning of the samples

The samples shall be stored for at least 16 h at a temperature of  $(23 \pm 2)^\circ\text{C}$  and a relative humidity of  $(50 \pm 5)\%$ .

### 5.4 Combustion

The sample, which shall be weighed after conditioning to an accuracy of 0,1 mg, shall be put into a combustion boat. The sample shall be evenly distributed on the bottom of the boat.

The boat shall then be inserted into the combustion tube placed in the tube furnace.

The flow rate of air shall be adjusted by means of a needle valve at  $(0,0157 \cdot D^2)$  litre $\cdot$ h $^{-1}$   $\pm 10\%$  and shall be kept constant during the test.

The sample shall be heated at an approximately uniform heating rate over a period of  $(40 \pm 5)$  min in order to raise the sample temperature to  $(800 \pm 10)^\circ\text{C}$ , after which it shall be maintained at that temperature for  $(20 \pm 1)$  min. The heating rate and sample temperature shall be checked by an appropriate method.

**NOTE:** An example of a method of confirming the heating rate and sample temperature is as follows:

Carry out, as a pre-test qualification procedure, a blank test with the flow rate of air as specified above, with a thermocouple, or other suitable temperature measuring device (suitably protected against corrosion), placed at the sample point in the empty combustion boat. Determine from this test a reproducible heating regime which will ensure that the required sample heating rate and temperature will be achieved during an actual test.

The bottles shall be disconnected, and the contents washed into a 1000 ml volumetric flask. Using distilled or demineralised waters, the bottles, the connecting links and end of the combustion tube (after cooling) and the silica plug, if any, shall also be washed into the flask, and the contents made up to 1000 ml.

After removing the combustion boat, the tube shall be cleaned throughout its length by calcination at 950°C.

#### 6. Determination of halogen acid content<sup>(1)</sup>

After cooling to ambient temperature, 200 ml of the solution shall be measured into a flask using either a pipette or burette and followed successively by 4 ml of concentrated nitric acid, 20 ml of 0,1 M silver nitrate and 3 ml of nitrobenzene<sup>(2)</sup>. The contents shall be well shaken to achieve agglomeration and coating of the silver halide.

Hereafter, 1 ml of a 40% aqueous solution of ferric ammonium sulphate containing a few drops of 6 M nitric acid shall be added, and the whole mixed together. The solution shall then be titrated with 0,1 M ammonium thiocyanate solution using magnetic stirring. The end-point shall be the red end-point for the titration.

The amount of halogen acid, expressed as milligrams of hydrochloric acid per gram of sample taken, is:

$$\frac{36,5(B - A) M \bullet \frac{1000}{200}}{m}$$

where

- A* is the volume of 0,1 M ammonium thiocyanate solution used in the determination;
- B* is the volume of 0,1 M ammonium thiocyanate solution used in the blank test;
- m* is the mass of sample taken in grams;
- M* is the molarity of ammonium thiocyanate solution.

Other analytical methods may be used having at least the same accuracy.

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<sup>(1)</sup> Using this method, halogen acids evolved, except hydrofluoric acid, will be expressed as hydrochloric acid

<sup>(2)</sup> WARNING NOTE: Nitrobenzene is regarded as highly toxic. Toluene or iso-amyl alcohol or di-ethyl ether are being assessed as a safer alternative, and users are invited to comment on their suitability.