SLOVENSKI STANDARD
SIST EN 50267-2-3:1999

01-julij-1999

Nadomešča:
SIST HD 602 S1:1998

Splošne metode za preskušanje kablov v požarnih razmerah - Preskušanje nastajanja plinov pri gorenju kabelskih materialov - 2-3. del: Postopki - Ugotavljanje stopnje kislosti plinov za kable z določanjem tehtane srednje vrednosti pH in prevodnosti

Common test methods for cables under fire conditions - Tests on gases evolved during combustion of materials from cables - Part 2-3: Procedures - Determination of degree of acidity of gases for cables by determination of the weighted average of pH and conductivity

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 2-3: Prüfverfahren - Bestimmung des Grades der Azidität der wesentlichen Werkstoffe von Kabeln durch die Bestimmung eines gewichteten Mittelwertes von pH-Wert und Leitfähigkeit

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 2-3: Procédures - Détermination de l'acidité des gaz des câbles par une mesure de la moyenne pondérée du pH et de la conductivité

Ta slovenski standard je istoveten z: **EN 50267-2-3:1998**

ICS:

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

SIST EN 50267-2-3:1999 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 50267-2-3

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Partly supersedes HD 602 S1:1992

Descriptors: Electrical installation, electric cables, fire tests, combustion tests, combustion products, burning gases, corrosive gases, determination, acidity, measurements, pH, conductivity, testing conditions, procedure

English version

Common test methods for cables under fire conditions Tests on gases evolved during combustion of materials from cables Part 2-3: Procedures - Determination of degree of acidity of gases for cables by determination of the weighted average of pH and conductivity

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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 CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CENELEC

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

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FOREWORD

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

When used in conjunction with EN 50267-1, this European Standard supersedes HD 602 S1:1992.

Significant technical differences are:

(a) limits for water quality are introduced
(b) requirements are given in an informative annex, as recommendations only.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50267-2-3 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.

CONTENTS

1. Scope

EN 50267-2-3 specifies the test method and procedure for the determination of the degree of acidity of gases evolved during the combustion of electric or optical cables by determination of the weighted average of pH and conductivity of the constituent materials.

NOTE: The relevant cable standard should indicate which materials from the cable should be tested.

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: Test apparatus.

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

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

3. Definitions

For the purposes of of EN 50267-2-3 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 together with the following measuring instruments:

- analytical balance of an accuracy of ±0,1 mg;
- pH meter to an accuracy of ±0,02, equipped with a suitable pH electrode;

- conductivity measuring device with a range 10^{-2} µS/mm to 10^{2} µS/mm and a suitable electrode;
- timer

5. Test method and procedure

5.1 General principle

A pre-determined quantity of the test material is burned in a tube furnace. The evolved gases are trapped by bubbling through wash bottles filled with distilled or demineralised water. Each wash bottle shall contain approximately 450 ml of distilled or demineralised water with the following properties:

pH 6,5 ± 1,0
conductivity ≤ 0,5 µS/mm

The acidity is measured by determination of pH value. The conductivity of the solution is also measured.

5.2 Samples and conditioning

Representative samples of the materials of the cable to be tested shall be taken. The samples shall be stored for at least 16 h at a temperature of (23 ± 2)°C and a relative humidity of (50 ± 5)%.

5.3 Test pieces

A test piece shall consist of (1000 ± 5) mg of each material to be tested taken from the representative sample. The test piece shall be cut into a number of smaller pieces.

5.4 Procedure

The test pieces, which shall be weighed to an accuracy of 1 mg, shall be put into a combustion boat. They shall be evenly distributed on the bottom of the boat.

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

NOTE 1: It is recommended that the air flow is not started until immediately prior to the commencement of the test.

The temperature value shall be measured by a thermocouple suitably protected against corrosion and placed inside the tube.

The boat containing the test pieces shall be quickly inserted into the effective zone of the tube and the timer shall be started. The combustion boat shall be placed in such a way that the distance between the boat and the exit end of the effective heating zone is ≥300 mm; the temperature measured at the position of the boat shall be not less than 935°C. The temperature measured at a position 300 mm from the boat in the direction of the air flow shall be not less than 900°C.

The combustion procedure under the air flow condition shall be continued for 30 min in the furnace.

NOTE 2: The operator should take precautions, i.e. the wearing of eye protection and suitable protective clothing, because certain materials ignite quickly, and can cause 'blow-back' of hot gases. Care should also be taken to avoid over-pressurisation of the system, and to allow for venting of exhaust gases.

After the test, and before determination of the pH and conductivity, the contents of both bottles shall be aggregated in a volumetric flask and made up to 1000 ml using water with the properties given in 5.1.

NOTE 3: After removing the combustion boat, the tube has to be cleaned throughout its length by calcination at 950°C.

5.5 Determination of the pH value and conductivity

5.5.1 *Calibration of the pH meter*

The pH meter shall be calibrated as proposed by the instrument supplier.

5.5.2 *Determination of the pH value and conductivity of the solution*

The pH value of the solution shall be determined at room temperature. The pH value shall be read by using the automatic temperature compensation, usually integral with the instrument. Conductivity measurements shall be performed in accordance with the test procedures as prescribed by the supplier.

6. Expression of the results

6.1 Mean value

For each material, three test determinations shall be undertaken. Calculate the mean value, standard deviation and coefficient of variation.

If the coefficient of variation expressed in per cent is higher than 5, a further three tests on this material are required and the mean value, standard deviation and coefficient of variation should be recalculated using the six values.

6.2 Weighted values

Using the mean values for each material determined from 6.1, the assessment of the pH and conductivity of fire gases expected to be evolved by a combination of materials found in a specified cable under similar test conditions may be estimated as follows:

6.2.1 *pH*

Measure the weight w_i ,of each non-metallic material,*i*, per unit length of cable.

The weighted value of pH, $pH^{/}$, is calculated as follows:

$$pH^{/} = log_{10}\left[\frac{\Sigma_i w_i}{\Sigma_i\left(\frac{w_i}{10^x}\right)}\right]$$

where x is the pH of each non-metallic material, *i*.

6.2.2 *Conductivity*

Measure the weight, w_i, of each non-metallic material, *i*, per unit length of cable.

The weighted value of conductivity, c', is calculated as follows:

$$c^{/} = \frac{\Sigma_i\ c \times w_i}{\Sigma_i w_i}$$

where c is the conductivity of each non-metallic material, i.