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Test on gases evolved during combustion of materials from cables – Part 2: Determination of acidity (by pH measurement) and conductivity

Essai sur les gaz émis lors de la combustion des matériaux prélevés sur câbles – Partie 2: Détermination de la conductivité et de l'acidité (par mesure du pH)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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TEST ON GASES EVOLVED DURING COMBUSTION OF MATERIALS FROM CABLES –

Part 2: Determination of acidity (by pH measurement) and conductivity

FOREWORD

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This Consolidated version of IEC 60754-2 bears the edition number 2.1. It consists of the second edition (2011-11) [documents 20/1265/FDIS and 20/1275/RVD] and its amendment 1 (2019-11) [documents 20/1883/FDIS and 20/1890/RVD]. The technical content is identical to the base edition and its amendment.

This Final version does not show where the technical content is modified by amendment 1. A separate Redline version with all changes highlighted is available in this publication.

International Standard IEC 60754-2 has been prepared by IEC technical committee 20: Electric cables.

It has the status of a group safety publication in accordance with IEC Guide 104.

This second edition constitutes a technical revision.

The significant technical changes with respect to the previous edition are as follows:

– improved definition of safety requirements relating to capture of gases;
– introduction of guidance on the preparation of test specimens for more even combustion;
– better expression of tolerances and precision;
– clarification of the conductivity and acidity functions;
– improved definition of the heating procedure;
– greater precision in the definition of the test temperature for the determination of pH value and conductivity;
– correction of the formulae for the calculation of the test results.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all the parts in the IEC 60754 series, published under the general title *Test on gases evolved during combustion of materials from cables*, can be found on the IEC website.

Le comité a décidé que le contenu de la publication de base et de son amendement ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "http://webstore.iec.ch" dans les données relatives à la publication recherchée. A cette date, la publication sera

- reconduite,
- supprimée,
- remplacée par une édition révisée, ou
- amendée.

INTRODUCTION

IEC 60754 consists of the following parts, under the general title *Test on gases evolved during combustion of materials from cables:*

– Part 1: *Determination of the halogen acid gas content*

– Part 2: *Determination of acidity (by pH measurement) and conductivity.*

– Part 3: *Measurement of low level of halogen content by ion chromatography*

IEC 60754-2 was originally developed due to concerns expressed by cable users over the amount of acid gas evolved when some cable insulating, sheathing and other materials are burned, as such corrosive effluent can cause extensive damage to electrical and electronic equipment not involved in the fire itself.

NOTE Guidance on the corrosivity of fire effluent is given in IEC 60695-5-1.

This standard provides a method for determining the acidity (by pH measurement) and conductivity of an aqueous solution of gases evolved during the combustion of materials so that limits can be agreed for cable specifications. As the test is not carried out on a complete cable test piece, for a hazard assessment the actual material volumes of the cable components should be taken into consideration.

The method provides an indirect assessment of corrosivity. However, the recommended limits of pH and conductivity can only be regarded as an indication, as the relationship between corrosion and these two parameters does not necessarily embrace all materials.

This part of IEC 60754 is linked with both IEC 60754-1 and IEC 60754-3. The test procedure for obtaining the absorption solution in this part of IEC 60754 is the same as for IEC 60754-3 but the test procedure differs considerably from IEC 60754-1.

TEST ON GASES EVOLVED DURING COMBUSTION OF MATERIALS FROM CABLES –

Part 2: Determination of acidity (by pH measurement) and conductivity

1 Scope

This part of IEC 60754 specifies the apparatus and procedure for the determination of the potential corrosivity of gases evolved during the combustion of materials taken from electric or optical fibre cable constructions by measuring the acidity (pH) and conductivity of an aqueous solution resulting from the gases evolved during the combustion. The heating (combustion) procedure of this part of IEC 60754 is the same as in IEC 60754-3.

The general method specified in this standard is intended for the testing of individual components used in a cable construction. Formulae are given for the calculation of a weighted value for a combination of materials found in a specified cable. The use of this method will enable the verification of relevant requirements for either individual components or combined components of a cable construction stated in the appropriate cable specification.

A simplified method is included for the testing of individual components where it is required only to demonstrate compliance with a stated performance requirement for quality control purposes.

NOTE 1 The relevant cable standard should indicate which components of the cable should be tested, and which method of calculation (see Clause 8) should be used in the case of dispute.

NOTE 2 This test method may be used to test materials to be used in cable manufacture, but a declaration of cable performance should not be made based on such a test.

NOTE 3 For the purposes of this standard, the term “electric cable” covers all insulated metallic conductor cables used for the conveyance of energy or signals.

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.

ISO 1042, *Laboratory glassware – One-mark volumetric flasks*
(available only in French)

ISO 3696, *Water for analytical laboratory use – Specification and test methods*

3 Terms and definitions

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

3.1
pH value
pH of an aqueous solution resulting from the gases evolved during the combustion of the material under the conditions given in this standard