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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Electric and optical fibre cables – Test methods for non-metallic materials – Part 411: Miscellaneous tests – Low-temperature brittleness of filling compounds

**Câbles électriques et à fibres optiques – Méthodes d'essai pour les matériaux non-métalliques –
Partie 411: Essais divers – Fragilité à basse température des matières de remplissage**

IEC 60811-411:2012

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FOREWORD

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International Standard IEC 60811-411 has been prepared by IEC technical committee 20: Electric cables.

This Part 411 of IEC 60811 cancels and replaces Clause 6 of IEC 60811-5-1:1990, which is withdrawn. Full details of the replacements are shown in Annex A of IEC 60811-100:2012.

There are no specific technical changes with respect to the previous edition, but see the Foreword to IEC 60811-100:2012.

The text of this standard is based on the following documents:

FDIS	Report on voting
20/1295/FDIS	20/1344/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

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

This part of IEC 60811 shall be used in conjunction with IEC 60811-100.

A list of all the parts in the IEC 60811 series, published under the general title *Electric and optical fibre cables – Test methods for non-metallic materials*, can be found on the IEC website.

Le comité a décidé que le contenu de cette publication ne sera pas modifié avant la date de stabilité indiquée sur le site web de la CEI 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

The IEC 60811 series specifies the test methods to be used for testing non-metallic materials of all types of cables. These test methods are intended to be referenced in standards for cable construction and for cable materials.

NOTE 1 Non-metallic materials are typically used for insulating, sheathing, bedding, filling or taping within cables.

NOTE 2 These test methods are accepted as basic and fundamental and have been developed and used over many years principally for the materials in all energy cables. They have also been widely accepted and used for other cables, in particular optical fibre cables, communication and control cables and cables for ships and offshore applications.

ELECTRIC AND OPTICAL FIBRE CABLES – TEST METHODS FOR NON-METALLIC MATERIALS –

Part 411: Miscellaneous tests – Low-temperature brittleness of filling compounds

1 Scope

This Part 411 of IEC 60811 gives the procedure to evaluate lower temperature brittleness which typically applies to filling compounds used for communication and optical fibre cables.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60811-100:2012, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 100: General*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60811-100 apply.

4 Test method

4.1 General

This part of IEC 60811 shall be used in conjunction with IEC 60811-100.

This test is used to examine the adhesion between the compound and other elements of the cable.

NOTE The test method does not apply to filling compounds with a drop-point higher than 80 °C.

4.2 Apparatus

For the purpose of this test, the different equipment used is as follows:

a) strips of lead alloy of dimensions 170 mm × 14 mm × 0,9 mm;

b) sheet brass pattern of dimensions 160 mm × 160 mm × 1 mm having a rectangular opening of 100 mm × 10 mm and a locating edge to avoid movement on the strips;

c) metal mandrel having a 10 mm diameter;

d) cold enclosure for –10 °C ± 1 °C.

4.3 Sample and test pieces preparation

From a sample of finished cable take the filling compound to be tested. Ten test pieces shall be prepared with this compound as described below.

Each strip of lead alloy shall be cleaned with a wire brush and laid on a plain base.

The pattern is placed on the strip so that the longitudinal edges of the strip are covered symmetrically.

The compound to be tested is spatulated at ambient temperature into the opening of the pattern, and excess material shall be removed by a warmed spatula or other suitable device. The pattern is then removed from the strip.

4.4 Ageing procedure

The test pieces shall be conditioned for at least 16 h at room temperature and then cooled to –10 °C ± 1 °C for at least 1 h. Each sample shall then immediately be wound helically around a metal mandrel having a 10 mm diameter and which is fixed in a horizontal position and pre-cooled to –10 °C. The rate of winding shall be about one revolution per second.

4.5 Evaluation of the results

Each test piece shall be examined for cracks, with normal or corrected vision, without magnification.

Not more than two of the ten test pieces shall show cracks. If more than two samples fail, the test may be repeated one more time.

NOTE A slight lifting off at the corners of the compound layer is acceptable.

5 Test report

The test report shall be in accordance with that given in IEC 60811-100.

Bibliography

IEC 60811-5-1:1990, *Common test methods for insulating and sheathing materials of electric cables – Part 5: Methods specific to filling compounds – Section One – Drop-point – Separation of oil – Lower temperature brittleness – Total acid number – Absence of corrosive components – Permittivity at 23 °C – D.C. resistivity at 23 °C and 100 °C*
(withdrawn)