BS EN 60811-405:2012

BSI Standards Publication

Electric and optical fibre cables — Test methods for non-metallic materials

Part 405: Miscellaneous tests — Thermal stability test for PVC insulations and PVC sheaths

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National foreword

This British Standard is the UK implementation of EN 60811-405:2012. It is identical to IEC 60811-405:2012.

In the UK, the relationship between the supersessions of BS EN 60811 series can be summarized as follows.

BS EN 60811-100 together with	Supersedes -
-201, -202, -203, -501	BS EN 60811-1-1:1995
-301, -302, -411, -601, -602, -603, -604	BS EN 60811-5-1:2000
-401, -412	BS EN 60811-1-2:1995
-402, -502, -503, -606	BS EN 60811-1-3:1995
-403, -404, -507	BS EN 60811-2-1:1998
-405, -409	BS EN 60811-3-2:1995
-406, -511, -605, -607	BS EN 60811-4-1:2004
-407, -408, -410, -510, -512, -513	BS EN 60811-4-2:2004
-504, -505, -506	BS EN 60811-1-4:1995
-508, -509	BS EN 60811-3-1:1995

Superseded standards are withdrawn

The UK participation in its preparation was entrusted by Technical Committee GEL/20, Electric cables, to Subcommittee GEL/20/17, Electric Cables - Low voltage.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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EN 60811-405

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Supersedes EN 60811-3-2:1995 (partially) + A2:2004 (partially)

English version

Electric and optical fibre cables - Test methods for non-metallic materials - Part 405: Miscellaneous tests - Thermal stability test for PVC insulations and PVC sheaths

(IEC 60811-405:2012)

Câbles électriques et à fibres optiques - Méthodes d'essai pour les matériaux non-métalliques - Partie 405: Essais divers - Essai de stabilité thermique pour les enveloppes isolantes et gaines en PVC (CEI 60811-405:2012)

Kabel, isolierte Leitungen und Glasfaserkabel - Prüfverfahren für nichtmetallene Werkstoffe - Teil 405: Sonstige Prüfungen - Prüfung der thermischen Stabilität von PVC-Isolierhüllen und PVC-Mänteln (IEC 60811-405:2012)

CENELEC

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Foreword

The text of document 20/1289/FDIS, future edition 1 of IEC 60811-405, prepared by IEC/TC 20 "Electric cables" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60811-405:2012.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2013-01-16
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2015-04-16

This document supersedes Clause 9 of EN 60811-3-2:1995 + A2:2004 (partially). Full details of the replacements are shown in Annex A of EN 60811-100:2012.

There are no technical changes with respect to EN 60811-3-2:1995 + A2:2004, but see the Foreword to EN 60811-100:2012.

This standard is to be read in conjunction with EN 60811-100.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This standard covers the Principle Elements of the Safety Objectives for Electrical Equipment Designed for Use within Certain Voltage Limits (LVD - 2006/95/EC)

Endorsement notice

The text of the International Standard IEC 60811-405:2012 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60811-100	2012	Electric and optical fibre cables - Test methods for non-metallic materials - Part 100: General	EN 60811-100	2012
ISO 695	1991	Glass - Resistance to attack by a boiling aqueous solution of mixed alkali - Method of test and classification	-	-
ISO 719	1985	Glass - Hydrolytic resistance of glass grains at 98 degrees C - Method of test and classification	-	-
ISO 1776	1985	Glass - Resistance to attack by hydrochloric acid at 100 degrees C - Flame emission or flame atomic absorption spectrometric method	-	-

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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 405: Miscellaneous tests – Thermal stability test for PVC insulations and PVC sheaths

1 Scope

This Part 405 of IEC 60811 specifies the procedure for the thermal stability test which applies to PVC compounds.

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*

ISO 695:1991, *Glass – Resistance to attack by a boiling aqueous solution of mixed alkali – Method of test and classification*

ISO 719:1985, *Glass – Hydrolytic resistance of glass grains at 98 degrees C – Method of test and classification*

ISO 1776:1985, *Glass – Resistance to attack by hydrochloric acid at 100 degrees C – Flame emission or flame atomic absorption spectrometric method*

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.

Unless otherwise specified, tests shall be carried out at room temperature.

4.2 Apparatus

The following apparatus shall be used:

a) Glass tubes closed at one end (e.g. by melting), 110 mm long with an outer diameter of approximately 5 mm and an inner diameter of (4,0 ± 0,5) mm.

   Tubes made of AR-glass shall be used complying with

   – ISO 695:1991; Alkali resistance, Class A2,

   – ISO 719:1985; Hydrolytic resistance, Class HGB3,

– ISO 1776:1985; Acid resistance, max. weight loss 150 μg Na_2O/100 cm^2;

b) Universal indicating paper with a pH range of 1 to 10.

c) Thermostatically controlled heating apparatus for a temperature specified in the standard for the type of cable, or, if the temperature is not specified in the cable standard, at (200 ± 0,5) °C. An oil bath is preferred and shall be used for type tests and in case of doubt.

d) Calibrated thermometer with divisions of 0,1 °C.

Depending on the type of thermometer, and the way in which it has been calibrated and is used, a mercury column correction may be necessary.

e) Stop-watch or a suitable time meter.

4.3 Pre-conditioning

All the tests shall be carried out not less than 16 h after the extrusion of the insulating or sheathing compounds.

4.4 Test procedure

The test procedure shall be as follows:

NOTE The use of a sufficiently accurate thermometer and compliance with the required test temperature limits are absolutely necessary to obtain reliable test results and to restrict scatter in these results.

a) From the insulation of each core to be tested or from the sheath to be tested, three samples, each of (50 ± 5) mg, shall be taken. Each sample shall consist of two or three small strips having a length between 20 mm and 30 mm.

Each sample shall be inserted into a glass tube as specified in item a) of 4.2. The sample shall occupy no more than the bottom 30 mm of the tube.

b) A strip of dry universal indicating paper, as specified in item b) of 4.2, about 15 mm long and 3 mm wide, shall be inserted into the open end (top) of the glass tube so that the strip protrudes about 5 mm out of the tube and can be bent to keep it in position.

c) The glass tube shall be placed into the heating apparatus, as specified in item c) of 4.2, which has already attained the test temperature specified. The glass tube shall be inserted into the heating apparatus to a depth of 60 mm.

d) The time taken for the universal indicating paper to change colour from a pH value of 5 pH to a value between 2 pH and 3 pH shall be measured, or the test continued for the specified duration without the colour change occurring. The colour change point shall be considered to have been reached when the red colouring of the universal indicating paper characteristic of a pH value of 3 is just becoming visible. The universal indicating paper shall be renewed (especially for long duration stabilities) towards the end of the expected test time every 5 min to 10 min, so that the change point is better visible.

4.5 Evaluation of results

The average value of the thermal stability times of the three samples shall not be lower than the value specified in the standard for the type of cable.

5 Test report

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

Bibliography

IEC 60811-3-2:1985, *Common test methods for insulating and sheathing materials of electric cables – Part 3: Methods specific to PVC compounds – Section Two – Loss of mass test – Thermal stability test*
(withdrawn)

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BSI Group Headquarters

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