BS EN 60811-507:2012

BSI Standards Publication

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

Part 507: Mechanical tests — Hot set test for cross-linked materials

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National foreword

This British Standard is the UK implementation of EN 60811-507:2012. It is identical to IEC 60811-507:2012.

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Superseded standards are withdrawn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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EUROPEAN STANDARD

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English version

Electric and optical fibre cables - Test methods for non-metallic materials - Part 507: Mechanical tests - Hot set test for cross-linked materials

(IEC 60811-507:2012)

Câbles électriques et à fibres optiques - Méthodes d'essai pour les matériaux non-métalliques - Partie 507: Essais mécaniques - Essai d'allongement à chaud pour les matériaux réticulés (CEI 60811-507:2012)

Kabel, isolierte Leitungen und Glasfaserkabel - Prüfverfahren für nichtmetallene Werkstoffe - Teil 507: Mechanische Prüfungen - Wärmedehnungsprüfung für vernetzte Werkstoffe (IEC 60811-507:2012)

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

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Foreword

The text of document 20/1303/FDIS, future edition 1 of IEC 60811-507, prepared by IEC/TC 20 "Electric cables" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60811-507:2012.

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)	2013-01-17
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2015-04-17

This document supersedes Clause 9 of EN 60811-2-1:1998 + A1:2001 (partially). Full details of the replacements are shown in Annex A of EN 60811-100:2012.

There are no specific technical changes with respect to EN 60811-2-1:1998, 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 60811-507:2012 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated :

IEC 60811-2-1:1998	NOTE	Harmonized as EN 60811-2-1:1998 (not modified).

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
IEC 60811-201	-	Electric and optical fibre cables - Test methods for non-metallic materials - Part 201: General tests - Measurement of insulation thickness	EN 60811-201	-
IEC 60811-202	-	Electric and optical fibre cables - Test methods for non-metallic materials - Part 202: General tests - Measurement of thickness of non-metallic sheath	EN 60811-202	-
IEC 60811-401	-	Electric and optical fibre cables - Test methods for non-metallic materials - Part 401: Miscellaneous tests - Thermal ageing methods - Ageing in an air oven	EN 60811-401	-
IEC 60811-501	-	Electric and optical fibre cables - Test methods for non-metallic materials - Part 501: Mechanical tests - Tests for determining the mechanical properties of insulating and sheathing compounds	EN 60811-501	-

CONTENTS

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 507: Mechanical tests – Hot set test for cross-linked materials

1 Scope

This Part 507 of IEC 60811 gives the procedure for the hot set test, which typically applies to cross-linkable compounds used for insulating and sheathing materials.

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*

IEC 60811-201, *Electric and optical fibre cables – Test methods for non-metallic materials Part 201: General tests – Measurement of insulation thickness*

IEC 60811-202, *Electric and optical fibre cables – Test methods for non-metallic materials Part 202: General tests – Measurement of thickness of non-metallic sheaths*

IEC 60811-401, *Electric and optical fibre cables – Test methods for non-metallic materials Part 401: Miscellaneous tests – Thermal ageing methods – Ageing in an air oven*

IEC 60811-501, *Electric and optical fibre cables – Test methods for non-metallic materials Part 501: Mechanical tests – Tests for determining the mechanical properties of insulating and sheathing compounds*

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 IEC 60811-100.

This standard gives the method for the hot set test, which applies to crosslinked compounds.

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

4.2 Apparatus

The apparatus consists of the following parts:

a) An oven capable of maintaining the temperature and tolerance specified.

b) Grips shall be provided, such that each test piece can be suspended from an upper grip in the oven and weights attached to a lower grip attached to the test piece.

NOTE When testing tubular test pieces, the fixing of the grips should not cause air-tight sealing. This can be achieved by inserting at least on one end a short piece of metal pin, having slightly smaller dimensions than those of the inner side of the test piece.

4.3 Sample and test piece preparation

A sample of the cable or cord, or of the sheath removed from the cable, or samples of core, cut into pieces of sufficient length, shall be taken, preferably from positions close to that from which the samples for the tensile tests without ageing were taken, in accordance with IEC 60811-501.

Test pieces, dumb-bell or tubular, shall be prepared according to IEC 60811-501.

Two test pieces of sheath and of insulation from each core, after they have been prepared and their cross-sectional areas measured, as specified in the test method of IEC 60811-201 and/or IEC 60811-202. Dumb-bell test pieces shall be prepared from the inner part of the sheath and of the insulation after any ridges and/or semi-conducting layers have been removed.

The thickness shall be not less than 0,8 mm and not more than 2,0 mm. If a thickness of 0,8 mm cannot be obtained from the original sample, a minimum thickness of less than 0,8 mm is permitted; however, the greatest possible thickness shall be used.

The central 20 mm for the larger dumb-bells, or 10 mm for the smaller dumb-bells, shall be marked on each test piece.

NOTE A thickness of less than 0,8 mm is only permitted where the specified thickness in the applicable cable standard is less than 0,8 mm.

4.4 Procedure

Test conditions are specified in the relevant cable standard.

NOTE 1 In the absence of any requirement in the relevant cable standard, Annex A of this standard gives a recommendation for test temperature and requirements.

The test pieces shall be suspended in the oven and the weights attached to the lower grip to exert a force of the value specified for the material in the relevant cable standard. This process shall be carried out as quickly as possible so that the oven door is open for the minimum time.

After the oven has regained its temperature, the test pieces shall be held in the oven for a further 10 min. The distance between the marker lines shall then be measured so that the elongation can be calculated. If the oven does not have a window and the oven door has to be opened to make the measurement, the measurement shall be made not more than 30 s after opening the door.

In case of dispute, the test shall be carried out in an oven with a window and the measurement made without opening the door.

The tensile force shall then be removed from the test pieces (by cutting the test pieces at the lower grip), and the test pieces left to recover in the oven. The test pieces shall be held in the oven for 5 min or until the specified temperature is regained, whichever is the longer.

The test pieces shall then be removed from the oven and allowed to cool slowly to ambient temperature, after which the distance between the marker lines shall be measured again.

NOTE 2 Adequate precautions should be taken to avoid physical danger from the handling of the heated grips, weights and test pieces.

4.5 Expression of the results

The mean value of the elongation, after 10 min at the specified temperature, with the weight attached, shall not exceed the value specified in the standard for the type of cable.

The mean value of the distance between the marker lines, after removing the test piece from the oven and allowing it to cool, shall not have increased from the value before inserting the test piece in the oven by more than the percentage specified in the relevant cable standard.

If one of the two samples fails the test, then two more samples shall be tested. If both pass the test, the sample is deemed to have passed the test.

5 Test report

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

Annex A
(informative)

Recommended performance requirement

The performance requirements for a particular type or class of insulated conductor or cable should preferably be given in the individual cable standard.

In the absence of any given requirement, it is recommended that the following values are adopted for any cable tested against this standard:

- test temperature: (200 ± 3) °C
- tensile force: (20 ± 0,5) N/cm^2
- maximum elongation under load: 175 %
- maximum residual elongation: 15 %

Bibliography

IEC 60811-2-1:1998, *Insulating and sheathing materials of electric and optical cables – Common test methods – Part 2-1: Methods specific to elastomeric compounds – Ozone resistance, hot set and mineral oil immersion tests*
(withdrawn)

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