

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Electric and optical fibre cables – Test methods for non-metallic materials –
Part 510: Mechanical tests – Methods specific to polyethylene and
polypropylene compounds – Wrapping test after thermal ageing in air**

**Câbles électriques et à fibres optiques – Méthodes d'essai pour les matériaux
non-métalliques –
Partie 510: Essais mécaniques – Méthodes spécifiques pour les mélanges
polyéthylène et polypropylène – Essai d'enroulement après vieillissement
thermique dans l'air**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRIC AND OPTICAL FIBRE CABLES –
TEST METHODS FOR NON-METALLIC MATERIALS –****Part 510: Mechanical tests –
Methods specific to polyethylene and polypropylene compounds –
Wrapping test after thermal ageing in air**

FOREWORD

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International Standard IEC 60811-510 has been prepared by IEC technical committee 20: Electric cables.

This Part 510 of IEC 60811 cancels and replaces Clause 10 of IEC 60811-4-2:2004, which is withdrawn.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
20/1306/FDIS	20/1355/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.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
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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.

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

Part 510: Mechanical tests – Methods specific to polyethylene and polypropylene compounds – Wrapping test after thermal ageing in air

1 Scope

This Part 510 of IEC 60811 specifies the test method for a wrapping test after thermal ageing in air. This test method applies specifically to polyolefin insulation in communication cables.

This test is intended for polyolefin insulations of unfilled cables and of dry cores for filled cables, where the insulation has a wall thickness of less than or equal to 0,8 mm.

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 60811-510:2012](https://standards.iteh.ai/catalog/standards/sist/1274a3c5-59da-4b63-a705-c73ff75468c4/iec-60811-510-2012)

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3 Terms and definitions

For the purposes of this document, the 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.

All the tests shall be carried out not less than 16 h after the extrusion or cross-linking, if any, of the compounds used for insulating or sheathing.

4.2 Apparatus

The apparatus consists of the following parts:

- a smooth metal mandrel and loading elements;
- a winding device, preferably with mechanically driven mandrel;
- an electrically heated cabinet with natural air flow.

4.3 Sampling

The test shall be carried out on four test pieces for each length of cable or core to be tested.

Take a sample 2 m long and cut it into four test pieces of equal length.

Carefully remove the coverings and braidings, if any, from the test pieces and any filling compound which may adhere to the cores.

Leave the conductor within the insulation. Then straighten the test pieces.

4.4 Ageing procedure

The test pieces prepared in accordance with 4.3 shall be suspended vertically for 14×24 h at (100 ± 2) °C in the middle of the heating chamber in accordance with 4.2 so that each test piece is at least 20 mm from any other test piece. Not more than 2 % of the chamber volume shall be occupied by the test pieces. Immediately after the ageing period, the test pieces shall be taken out of the chamber and left at ambient temperature, without being exposed to direct sunlight, for at least 16 h.

NOTE The ageing time and/or ageing temperature may be increased if required by the relevant cable specifications.

4.5 Test procedure

4.5.1 Test pieces according to 4.3 shall be subjected, after ageing in accordance with 4.4, to a winding test at ambient temperature.

4.5.2 The conductor shall be laid bare at one end. A weight shall be applied to the exposed conductor end, exerting a pull of $15 \text{ N/mm}^2 \pm 20 \%$ with respect to the conductor cross-section. Ten windings shall be made on the other end of the test piece by means of a winding device in accordance with 4.2 on a metal mandrel at a speed of about 1 revolution per 5 s.

The winding diameter shall be 1 to 1,5 times the test piece diameter. Subsequently, the test pieces wound on the mandrel shall be removed from the latter and shall be kept in their helical form for 24 h at (70 ± 2) °C in the vertical position, substantially in the middle of the heating chamber in accordance with 4.2.

4.6 Evaluation of results

After cooling down to ambient temperature, the test pieces shall show no cracks when examined with normal or corrected vision without magnification. The test may be repeated once more if a test piece fails.

5 Test report

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

Bibliography

IEC 608011-4-2:2004, *Insulating and sheathing materials of electric and optical cables – Common test methods – Part 4-2: Methods specific to polyethylene and polypropylene compounds – Tensile strength and elongation at break after conditioning at elevated temperature – Wrapping test after conditioning at elevated temperature – Wrapping test after thermal ageing in air – Measurement of mass increase – Long-term stability test – Test method for copper-catalyzed oxidative degradation*
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