

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Electric and optical fibre cables – Test methods for non-metallic materials –
Part 506: Mechanical tests – Impact test at low temperature for insulations
and sheaths**

**Câbles électriques et à fibres optiques – Méthodes d'essai pour les matériaux
non-métalliques –
Partie 506: Essais mécaniques – Essai de choc à basse température pour les
enveloppes isolantes et les gaines**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRIC AND OPTICAL FIBRE CABLES –
TEST METHODS FOR NON-METALLIC MATERIALS –****Part 506: Mechanical tests –
Impact test at low temperature for insulations and sheaths**

FOREWORD

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International Standard IEC 60811-506 has been prepared by IEC technical committee 20: Electric cables.

This Part 506 of IEC 60811 cancels and replaces 8.5 of IEC 60811-1-4:1985, which is withdrawn.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
20/1302/FDIS	20/1351/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- withdrawn,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 506: Mechanical tests – Impact test at low temperature for insulations and sheaths

1 Scope

This Part 506 of IEC 60811 gives the procedure for performing impact tests at low temperature on extruded insulations and sheaths.

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.

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

Tests shall be carried out at the temperature specified in the relevant cable standard.

This cold impact test is intended for sheathed cables of any type, irrespective of the type of insulation of the cores, and for the insulation of wires, cables and flat cables without sheath if required by the relevant cable standard.

The insulation of sheathed cables is not subjected directly to the cold impact test.

4.2 Sampling and preparation of the test pieces

Three pieces of complete cable each having a length at least five times the diameter of the cable with a minimum of 150 mm, shall be taken. All covering external to the component shall be removed.

4.3 Apparatus

The apparatus to be used for this test is represented in Figure 1, with explanations.

The apparatus shall be placed on a pad of sponge rubber about 40 mm thick and held in a suitable low temperature cabinet before and during the test.

4.4 Test conditions

The test temperature shall be as specified for the type of compound in the relevant cable standard.

For power cables for fixed installations, the mass of the hammer for testing the samples shall not be less than the values as given in Table 1.

Table 1 – Mass of hammer for power cables in fixed installations

Overall diameter mm		Mass of the hammer g
Above	Up to and including	
–	4,0	100
4,0	6,0	200
6,0	9,0	300
9,0	12,5	400
12,5	20,0	500
20,0	30,0	750
30,0	50,0	1 000
50,0	75,0	1 250
75,0	–	1 500

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For flexible cables and telecommunication cables, the mass of the hammer for testing the sample shall not be less than the values as shown in Table 2.

Table 2 – Mass of hammer for flexible cables and telecommunication cables

Overall diameter mm		Mass of the hammer g
Above	Up to and including	
Flat cables		100
–	6,0	100
6,0	10,0	200
10,0	15,0	300
15,0	25,0	400
25,0	35,0	500
35,0	–	600

The overall diameter referred to in Table 1 and Table 2 shall be measured on each test piece by a vernier calliper or a measuring tape.

Flat cables shall be tested with their minor axis perpendicular to the steel base.

4.5 Procedure

The apparatus and the pieces of cable to be tested shall be placed side by side in a suitable low temperature cabinet and maintained at the specified temperature. The contents of the refrigerator shall then be allowed to cool for a period not less than 16 h, which includes the time for the apparatus to cool down. If the apparatus has been pre-cooled, a shorter cooling period is permissible, but not less than 1 h provided that the test pieces have attained the prescribed test temperature.

At the end of the prescribed periods, each piece in turn shall be placed in position as shown in Figure 1, and the hammer shall be allowed to fall from a height of 100 mm.

Before examining the insulation of cables or cables without a sheath, the test pieces shall be allowed to attain approximately ambient temperature after the test.

The insulation shall then be examined after the test pieces have been twisted, while held straight, through an angle equal to 360° for each 100 mm length. If, however, it is not possible to twist the samples in this way, they shall be examined as specified for the sheath.

Before examining the sheath of cables, if any, the test pieces shall be allowed to attain approximately room temperature and then be immersed in hot water; the sheath shall then be cut open in the direction of the axis of the cables.

NOTE Hand-hot water (40 °C to 50 °C) has been found to be adequate.

The inside and outside of the sheath and the insulation shall then be examined. The insulation of cables with sheath shall be examined on the outside only.

4.6 Expression of results

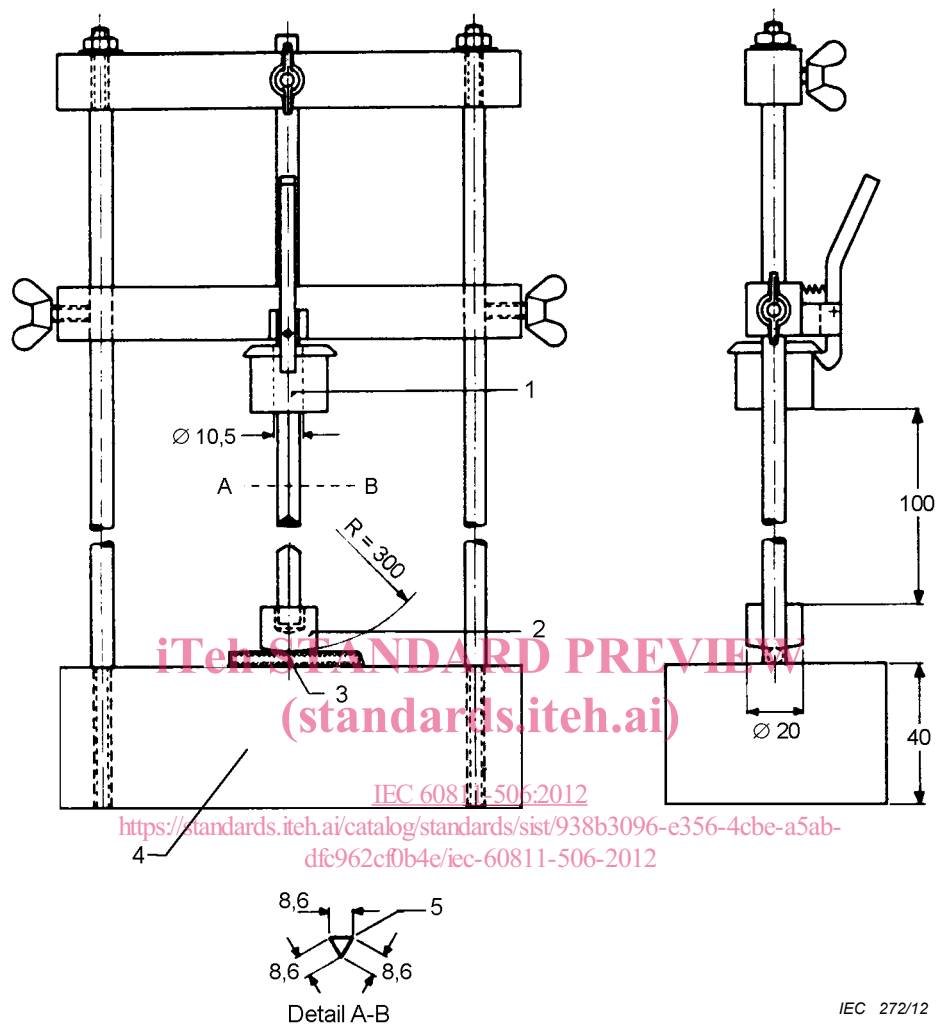
The three pieces shall show no cracks when examined with normal or corrected vision without magnification.

If only one sample of the three shows cracks, then the test shall be repeated on three further samples. If none of these shows cracks, then the requirements of the test are met. However, if any one of the three additional samples shows cracks, the insulation and/or sheath does not comply with the test requirements.

5 Test report

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

**Key**

- 1 hammer
- 2 steel intermediate piece 100 g
- 3 test piece
- 4 steel 10 kg
- 5 slightly rounded edges

Figure 1 – Impact test apparatus