

# PRE-RELEASE VERSION (FDIS)



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**Submarine power cables with extruded insulation and their accessories for rated voltages from 6 kV ( $U_m = 7,2$  kV) up to 60 kV ( $U_m = 72,5$  kV) –  
Test methods and requirements**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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TITLE:

**Submarine power cables with extruded insulation and their accessories for rated voltages from 6 kV (Um = 7,2 kV) up to 60 kV (Um = 72,5 kV) - Test methods and requirements**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SUBMARINE POWER CABLES WITH EXTRUDED INSULATION  
AND THEIR ACCESSORIES FOR RATED VOLTAGES  
FROM 6 kV ( $U_m = 7,2$  kV) UP TO 60 kV ( $U_m = 72,5$  kV) –  
TEST METHODS AND REQUIREMENTS**

FOREWORD

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International Standard IEC 63026 has been prepared by IEC technical committee 20: Electric cables.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
20/XX/FDIS	20/XX/RVD

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

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



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

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- withdrawn,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

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## INTRODUCTION

As a result of the growing demand for inter-array cables for offshore windfarms, IEC TC 20 decided to develop an International Standard for medium voltage submarine cable systems.

The worldwide mandate to reduce carbon emissions has stimulated major developments of power production systems where the principal contribution comes from offshore wind farms.

Due to the location of these wind power generation systems, large amounts of submarine cables are required to inter-connect individual power generating units (inter-array cable) and to connect to the mainland (power export cable).

Many offshore wind farms have been built or are today under construction and there are plans for even more farms to be built in future. Although the focus is on wind farms, the need for cable connections to other types of offshore generation will increase. At this stage most of the information and expertise already available on cables for the connection to the mainland grid can be found in CIGRE documents.

Requirements of this document are mainly based on IEC 60502-2, IEC 60840 and CIGRE TB 490, *Recommendations for testing of long AC submarine cables with extruded insulation for system voltage above 30 (36) kV to 500 (550) kV*. References to the relevant applicable mechanical tests are taken from CIGRE TB 623, *Recommendations for mechanical testing of submarine cables*.

A list of relevant additional references is given in the bibliography.

# **SUBMARINE POWER CABLES WITH EXTRUDED INSULATION AND THEIR ACCESSORIES FOR RATED VOLTAGES FROM 6 kV ( $U_m = 7,2$ kV) UP TO 60 kV ( $U_m = 72,5$ kV) – TEST METHODS AND REQUIREMENTS**

## **1 Scope**

This document specifies test methods and requirements for power cable systems, cables with extruded insulation and their accessories for fixed submarine installations, for rated voltages from 6 kV ( $U_m = 7,2$  kV) up to 60 kV ( $U_m = 72,5$  kV).

This document includes the electrical tests and the physical tests on materials and components as well as the specific mechanical tests that are applicable to submarine cable systems.

The requirements apply to armoured single-core cables and three-core cables in combination with their accessories, terminations and joints for usual conditions of installation and operation, but not to special cables and their accessories, such as submarine cables for dynamic applications (i.e. for direct connection to a floating structure), for which modifications to the standard tests can be necessary or special test conditions be devised.

This document is applicable to submarine cables installed in permanently submerged conditions with water depths up to 250 m.

NOTE This document does not include accessories having a mechanical function only, such as hang-offs or armour clamps.

## **2 Normative references**

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60228, *Conductors of insulated cables*

IEC 60229:2007, *Electric cables – Tests on extruded oversheaths with a special protective function*

IEC 60230, *Impulse tests on cables and their accessories*

IEC 60287-1-1:2006, *Electric cables – Calculation of the current rating – Part 1-1: Current rating equations (100 % load factor) and calculation of losses – General*

IEC 60502-2:2014, *Power cables with extruded insulation and their accessories for rated voltages from 1 kV ( $U_m = 1,2$  kV) up to 30 kV ( $U_m = 36$  kV) – Part 2: Cables for rated voltages from 6 kV ( $U_m = 7,2$  kV) up to 30 kV ( $U_m = 36$  kV)*

IEC 60502-4, *Power cables with extruded insulation and their accessories for rated voltages from 1 kV ( $U_m = 1,2$  kV) up to 30 kV ( $U_m = 36$  kV) – Part 4: Test requirements on accessories for cables with rated voltages from 6 kV ( $U_m = 7,2$  kV) up to 30 kV ( $U_m = 36$  kV)*

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 sheath*

IEC 60811-203, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 203: General tests – Measurement of overall dimensions*

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 60811-402, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 402: Miscellaneous tests – Water absorption tests*

IEC 60811-403, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 403: Miscellaneous tests – Ozone resistance test on cross-linked compounds*

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*

IEC 60811-502, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 502: Mechanical tests – Shrinkage test for insulations*

IEC 60811-503, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 503: Mechanical tests – Shrinkage test for sheaths*

IEC 60811-507, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 507: Mechanical tests – Hot set test for cross-linked materials*

IEC 60811-508, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 508: Mechanical tests – Pressure test at high temperature for insulation and sheaths*

IEC 60811-605, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 605: Physical tests – Measurement of carbon black and/or mineral filler in polyethylene compounds*

IEC 60840, *Power cables with extruded insulation and their accessories for rated voltages above 30 kV ( $U_m = 36$  kV) up to 150 kV ( $U_m = 170$  kV) – Test methods and requirements*

IEC 60885-3, *Electrical test methods for electric cables – Part 3: Test methods for partial discharge measurements on lengths of extruded power cables*

ISO 48-2, *Rubber, vulcanized or thermoplastic – Determination of hardness – Part 2: Hardness between 10 IRHD and 100 IRHD*