



IEC 60227-3

Edition 3.0 2024-02

INTERNATIONAL STANDARD

**Polyvinyl chloride insulated cables of rated voltages up to and including
450/750 V –
Part 3: Non-sheathed cables for fixed wiring**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.060.20

ISBN 978-2-8322-8250-2

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

| | |
|--|----|
| FOREWORD..... | 4 |
| INTRODUCTION..... | 6 |
| 1 Scope..... | 7 |
| 2 Normative references | 7 |
| 3 Terms and definitions | 8 |
| 4 Single-core non-sheathed cable with rigid conductor for general purposes | 8 |
| 4.1 Code designation | 8 |
| 4.2 Rated voltage | 8 |
| 4.3 Construction | 9 |
| 4.3.1 Conductors | 9 |
| 4.3.2 Insulation..... | 9 |
| 4.3.3 Overall diameter | 9 |
| 4.4 Tests | 10 |
| 4.5 Guidance on use..... | 10 |
| 5 Single-core non-sheathed cable with flexible conductor for general purposes | 11 |
| 5.1 Code designation | 11 |
| 5.2 Rated voltage | 11 |
| 5.3 Construction | 11 |
| 5.3.1 Conductors | 11 |
| 5.3.2 Insulation..... | 11 |
| 5.3.3 Overall diameter | 12 |
| 5.4 Tests | 12 |
| 5.5 Guidance on use..... | 12 |
| 6 Single-core non-sheathed cable with solid conductor for internal wiring for a conductor temperature of 70 °C | 13 |
| 6.1 Code designation | 13 |
| 6.2 Rated voltage | 13 |
| 6.3 Construction | 13 |
| 6.3.1 Conductors | 13 |
| 6.3.2 Insulation..... | 14 |
| 6.3.3 Overall diameter | 14 |
| 6.4 Tests | 14 |
| 6.5 Guidance on use..... | 14 |
| 7 Single-core non-sheathed cable with flexible conductor for internal wiring for a conductor temperature of 70 °C | 15 |
| 7.1 Code designation | 15 |
| 7.2 Rated voltage | 15 |
| 7.3 Construction | 15 |
| 7.3.1 Conductors | 15 |
| 7.3.2 Insulation..... | 16 |
| 7.3.3 Overall diameter | 16 |
| 7.4 Tests | 16 |
| 7.5 Guidance on use..... | 16 |
| 8 Single-core non-sheathed cable with solid conductor for internal wiring for a conductor temperature of 90 °C | 17 |
| 8.1 Code designation | 17 |
| 8.2 Rated voltage | 17 |

- 8.3 Construction 17
 - 8.3.1 Conductors 17
 - 8.3.2 Insulation 17
 - 8.3.3 Overall diameter 18
- 8.4 Tests 18
- 8.5 Guidance on use 18
- 9 Single-core non-sheathed cable with flexible conductor for internal wiring for a conductor temperature of 90 °C 19
 - 9.1 Code designation 19
 - 9.2 Rated voltage 19
 - 9.3 Construction 19
 - 9.3.1 Conductors 19
 - 9.3.2 Insulation 19
 - 9.3.3 Overall diameter 20
 - 9.4 Tests 20
 - 9.5 Guidance on use 20
- Bibliography 22

- Table 1 – General data for type 60227 IEC 01 10
- Table 2 – Tests for type 60227 IEC 01 11
- Table 3 – General data for type 60227 IEC 02 12
- Table 4 – Tests for type 60227 IEC 02 13
- Table 5 – General data for type 60227 IEC 05 14
- Table 6 – Tests for type 60227 IEC 05 15
- Table 7 – General data for type 60227 IEC 06 16
- Table 8 – Tests for type 60227 IEC 06 17
- Table 9 – General data for type 60227 IEC 07 18
- Table 10 – Tests for type 60227 IEC 07 19
- Table 11 – General data for type 60227 IEC 08 20
- Table 12 – Tests for type 60227 IEC 08 21

INTERNATIONAL ELECTROTECHNICAL COMMISSION

POLYVINYL CHLORIDE INSULATED CABLES OF RATED VOLTAGES UP TO AND INCLUDING 450/750 V –

Part 3: Non-sheathed cables for fixed wiring

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 60227-3 has been prepared by IEC technical committee 20: Electric cables. It is an International Standard.

This third edition cancels and replaces the second edition published in 1992 and Amendment 1:1997. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) the reference to tests according to IEC 60227-2 has been withdrawn and replaced with a reference to IEC 63294;
- b) normative references have been updated.

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

| Draft | Report on voting |
|--------------|------------------|
| 20/2141/FDIS | 20/2154/RVD |

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 60227 series, published under the general title *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V*, can be found on the IEC website.

This document is to be used in conjunction with IEC 60227-1.

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

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

The IEC 60227 series, published under the general title *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V*, consists of the following parts:

IEC 60227-1: General requirements;

IEC 60227-2: Test methods (withdrawn and replaced by IEC 63294);

IEC 60227-3: Non-sheathed cables for fixed wiring;

IEC 60227-4: Sheathed cables for fixed wiring;

IEC 60227-5: Flexible cables (cords);

IEC 60227-6: Lift cables and cables for flexible connections;

IEC 60227-7: Flexible cables screened and unscreened with two or more conductors and of rated voltages up to and including 300/500 V.

This part of IEC 60227, when used in conjunction with IEC 60227-1, forms the complete standard for non-sheathed cables for fixed wiring.

POLYVINYL CHLORIDE INSULATED CABLES OF RATED VOLTAGES UP TO AND INCLUDING 450/750 V –

Part 3: Non-sheathed cables for fixed wiring

1 Scope

This part of IEC 60227 details the particular standards for polyvinyl chloride insulated single-core non-sheathed cables for fixed wiring of rated voltages up to and including 450/750 V.

This document provides the particular requirements for non-sheathed cables for fixed wiring which apply in addition to the appropriate requirements specified in IEC 60227-1, which apply to all cables.

The tests for cables specified in the IEC 60227 series are described in IEC 63294.

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 60227-1, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 1: General requirements*

IEC 60228, *Conductors of insulated cables*

IEC 60332-1-2, *Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame*

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 60811-405, *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 60811-409, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 409: Miscellaneous tests – Loss of mass test for thermoplastic insulations and sheaths*

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 60811-504, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 504: Mechanical tests – Bending tests at low temperature for insulation and sheaths*

IEC 60811-505, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 505: Mechanical tests – Elongation at low temperature for insulations and sheaths*

IEC 60811-506, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 506: Mechanical tests – Impact test at low temperature for insulations and sheaths*

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 60811-509, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 509: Mechanical tests – Test for resistance of insulations and sheaths to cracking (heat shock test)*

IEC 62440, *Electric cables with a rated voltage not exceeding 450/750 V – Guide to use*

IEC 63294:2021, *Test methods for electric cables with rated voltages up to and including 450/750 V*