

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Guidance for the selection of high-voltage A.C. cable systems

Lignes directrices pour le choix de systèmes de câbles à haute tension en courant alternatif



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INTERNATIONAL
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**GUIDANCE FOR THE SELECTION OF
HIGH-VOLTAGE A.C. CABLE SYSTEMS**

FOREWORD

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International Standard IEC 60183 has been prepared by IEC technical committee 20: Electric cables.

This third edition cancels and replaces the second edition, published in 1984, and its Amendment 1 (1990) and constitutes a technical revision.

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

- the scope has been changed to a.c. high-voltage cables and cable systems;
- guidance relates to cables with extruded insulation;
- submarine cables are not covered but cables laid in water are covered;
- operation of systems with special bonding of the screen is covered;
- there is guidance on accessories;
- environmental aspects are addressed.

The text of this standard is based on the following documents:

FDIS	Report on voting
20/1530/FDIS	20/1558/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.

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- withdrawn,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
- amended.

GUIDANCE FOR THE SELECTION OF HIGH-VOLTAGE A.C. CABLE SYSTEMS

1 Scope

This International Standard is intended to give guidance in the selection of a.c. high-voltage cables and cable systems with extruded insulation and mainly to be used on three-phase alternating systems operating at voltages exceeding $U = 1$ kV (in this standard the term 'high voltage' is used to cover any cable above 1 kV). Submarine cables are not included in the scope.

Guidance is given in the selection of the conductor size, insulation level and constructional requirements of cable to be used. In addition, information necessary to enable the appropriate selection to be made is summarized.

Paper insulated power cables are not considered in this standard for their selection into cable systems. However, when selecting cables with extruded insulation to be connected together with existing paper insulated cables, particular consideration for their proper compatibility, accessories and operational characteristics should be made.

Environmental aspects are mentioned at the level at which they may influence the selection of high-voltage cables and their application.

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 60071-1:2006, *Insulation co-ordination – Part 1: Definitions, principles and rules*
Amendment 1:2010

IEC 60228, *Conductors of insulated cables*

IEC 60287 (all parts), *Electric cables – Calculation of the current rating*

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 60287-3-1, *Electric cables – Calculation of the current rating – Part 3-1: Sections on operating conditions – Reference operating conditions and selection of cable type*

IEC 60287-3-2, *Electric cables – Calculation of the current rating – Part 3-2: Sections on operating conditions – Economic optimization of power cable size*

IEC 60502, *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)*

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 62067, *Power cables with extruded insulation and their accessories for rated voltages above 150 kV ($U_m = 170$ kV) up to 500 kV ($U_m = 550$ kV) – Test methods and requirements*

IEC TS 60815-1, *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 1: Definitions, information and general principles*

IEC 62271-209, *High-voltage switchgear and controlgear – Part 209: Cable connections for gas-insulated metal-enclosed switchgear for rated voltages above 52 kV – Fluid-filled and extruded insulation cables – Fluid-filled and dry-type cable terminations*

ISO 14000, *Environmental management*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 Voltages pertaining to the cable and its accessories

NOTE Cables will henceforth be designated by U_0/U (U_m) to provide guidance on compatibility with switchgear and transformers. Table 1 gives this information.

3.1.1

rated voltage

U_0

rated r.m.s. power-frequency voltage between each conductor and screen or sheath for which cables and accessories are designed

3.1.2

rated voltage between conductors

U

rated r.m.s. power-frequency voltage between any two conductors for which cables and accessories are designed

Note 1 to entry: This quantity only affects the design of non-radial field cables and accessories.

3.1.3

highest system voltage

U_m

maximum r.m.s. power-frequency voltage between any two conductors for which cables and accessories are designed

Note 1 to entry: It is the highest voltage that can be sustained under normal operating conditions at any time and at any point in a system and excludes temporary voltage variations due to fault conditions and the sudden disconnection of large loads.

3.1.4

peak impulse voltage

U_p

peak value of the lightning impulse withstand voltage (and switching, where applicable) between each conductor and screen or sheath for which cables and accessories are designed

3.2 Voltages pertaining to the system on which cables and accessories are to be used

3.2.1

nominal voltage of system

r.m.s. phase-to-phase voltage by which the system is designated and to which certain operating characteristics of the system are related