

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Insulation co-ordination –
Part 11: Definitions, principles and rules for HVDC system**

**Coordination de l'isolement –
Partie 11: Définitions, principes et règles relatifs au réseau CCHT**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INSULATION CO-ORDINATION –

Part 11: Definitions, principles and rules for HVDC system

FOREWORD

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IEC 60071-11 has been prepared by IEC technical committee 99: Insulation co-ordination and system engineering of high voltage electrical power installations above 1,0 kV AC and 1,5 kV DC. It is an International Standard.

This international standard replaces, in conjunction with IEC 60071-12, IEC 60071-5 published in 2014.

This edition includes the following significant technical changes with respect to IEC 60071-5:2014:

- a) This standard applies to both LCC and VSC HVDC systems whereas IEC 60071-5 only dealt with LCC HVDC system;
- b) Annex C (normative) gives the recommended specified withstand voltage (LI and SI);
- c) Annex C (normative) gives the minimum air clearances;
- d) Annex E shows the correlation of clauses between this standard and IEC 60071-5:2014.

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

Draft	Report on voting
99/374/FDIS	99/394/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/standardsdev/publications.

A list of all parts in the IEC 60071 series, published under the general title *Insulation co-ordination*, can be found on the IEC website.

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- withdrawn,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

INTRODUCTION

As the demand for electrical energy is growing, more and more HVDC projects have appeared, and the voltage up to $\pm 1 100$ kV so far. However, the nominal voltage, nominal current and insulation levels for HVDC system are not yet as standardized as the AC system.

In October 2016, IEC Technical Committee 28 (Insulation co-ordination) established AHG 8 (Ad hoc group 8) to make the roadmap for HVDC system insulation co-ordination standards.

After IEC TC 28 was merged into IEC TC 99 in 2017, JWG 13 (Joint working group 13) was built by IEC TC 99 and TC 115 and was responsible for making the series standards for HVDC system according to the approved roadmap, as follows:

- a) Part 11: Definitions, principles and rules for HVDC system;
- b) Part 12: Application guidelines for LCC HVDC converter stations;
- c) Part 13: Application guidelines for VSC HVDC converter stations;
- d) Part 14: Insulation co-ordination for AC/DC filters;
- e) Part 15: Insulation co-ordination for DC transmission lines.

INSULATION CO-ORDINATION –

Part 11: Definitions, principles and rules for HVDC system

1 Scope

This part of IEC 60071 applies to high-voltage direct current (HVDC) systems. It specifies the principles on the procedures for the determination of the specified withstand voltages, creepage distance and air clearances for the equipment and the installations of these systems.

This document gives the insulation co-ordination principles related to line commutated converter (LCC) and voltage sourced converters (VSC) HVDC systems. The main principles of this document also apply to other special converter configurations of LCC, such as the capacitor commutated converter (CCC) as well as the controlled series compensated converter (CSCC), etc.

This document applies to insulation co-ordination of equipment connected between the converter AC bus (including the AC harmonic filters, the converter transformer, the circuit breakers) and the DC line side. The line and cable terminations in so far as they influence the insulation co-ordination of converter station equipment are also covered.

This document applies only for HVDC applications in power systems and not for industrial conversion equipment. Principles and guidance given are for insulation co-ordination purposes only. The requirements for human safety are not covered by this document.

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 60060-1, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60071-1:2019, *Insulation co-ordination – Part 1: Definitions, principles and rules*

IEC 60071-2:2008, *Insulation co-ordination – Part 2: Application guidelines*

IEC 60099-4:2014, *Surge arresters – Part 4: Metal-oxide surge arresters without gaps for a.c. systems*

IEC TS 60815-1:2008, *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 1: Definitions, information and general principles*

IEC TS 60815-2:2008, *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 2: Ceramic and glass insulators for a.c. systems*

IEC TS 60815-3:2008, *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 3: Polymer insulators for a.c. systems*