

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Insulation co-ordination –
Part 12: Application guidelines for LCC HVDC converter stations**

**Coordination de l'isolement –
Partie 12: Lignes directrices en matière d'application pour stations de
conversion à courant continu haute tension (CCHT) équipées de convertisseurs
commutés par le réseau (LCC)**



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IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references	7
3 Terms, definitions, symbols and abbreviated terms.....	7
3.1 Terms and definition	7
3.2 Symbols and abbreviated terms	8
3.2.1 General	8
3.2.2 Subscripts	8
3.2.3 Letter symbols	8
3.2.4 Abbreviated terms	9
4 Typical LCC HVDC converter station schemes	9
5 Voltages and overvoltages in service.....	12
5.1 Continuous operating voltages at various locations in the converter station	12
5.2 Peak continuous operating voltage (PCOV) and crest continuous operating voltage (CCOV)	16
5.3 Sources and types of overvoltages	18
5.4 Temporary overvoltage	18
5.4.1 General	18
5.4.2 Temporary overvoltage on the AC side	18
5.4.3 Temporary overvoltages on the DC side	19
5.5 Slow-front overvoltages	19
5.5.1 General	19
5.5.2 Slow-front overvoltages on the AC side	19
5.5.3 Slow-front overvoltages on the DC side	20
5.6 Fast-front, very-fast-front and steep-front overvoltages	20
6 Arrester characteristics and stresses	21
6.1 Arrester characteristics	21
6.2 Arrester specification	22
6.3 Arrester stresses.....	23
6.3.1 General	23
6.3.2 AC bus arrester (A).....	24
6.3.3 AC filter arrester (FA)	24
6.3.4 Transformer valve winding arresters (T).....	25
6.3.5 Valve arrester (V)	25
6.3.6 Bridge arrester (B).....	28
6.3.7 Converter unit arrester (C).....	28
6.3.8 Mid-point DC bus arrester (M).....	29
6.3.9 Converter unit DC bus arrester (CB)	29
6.3.10 DC bus and DC line/cable arrester (DB and DL/DC)	30
6.3.11 Neutral bus arrester (E, EL, EM in Figure 3, EB, E1, EL, EM in Figure 1)	30
6.3.12 DC reactor arrester (DR)	31
6.3.13 DC filter arrester (FD)	32
6.3.14 Earth electrode station arrester.....	32
6.4 Protection strategy.....	32
6.4.1 General	32
6.4.2 Insulation directly protected by a single arrester	32
6.4.3 Insulation protected by more than one arrester in series	32

6.4.4	Valve side neutral point of transformers	33
6.4.5	Insulation between phase conductors of the converter transformer	33
6.4.6	Summary of protection strategy	33
6.5	Summary of events and stresses	36
7	Design procedure of insulation co-ordination	37
7.1	General.....	37
7.2	Arrester requirements	38
7.3	Representative overvoltages (U_{rp}).....	38
7.4	Determination of the co-ordination withstand voltages (U_{cw}).....	40
7.5	Determination of the required withstand voltages (U_{rw})	40
7.6	Determination of the specified withstand voltage (U_w)	40
8	Study tools and system modelling.....	40
8.1	General.....	40
8.2	Study approach and tools	40
8.3	System details	41
8.3.1	Modelling and system representation.....	41
8.3.2	AC network and AC side of the LCC HVDC converter station.....	43
8.3.3	DC overhead line/cable and earth electrode line details.....	44
8.3.4	DC side of an LCC HVDC converter station details	44
Annex A (informative)	Example of insulation co-ordination for LCC HVDC converter stations.....	45
A.1	General.....	45
A.2	Example for LCC HVDC converter station in a pole with one 12-pulse converter	45
A.2.1	Arrester protective scheme	45
A.2.2	Arrester stresses, protection and insulation levels	45
A.2.3	Transformer valve side withstand voltages.....	50
A.2.4	Air-insulated smoothing reactors withstand voltages	50
A.2.5	Results	52
A.3	Example for LCC HVDC converter station in a pole with two 12-pulse converters in series.....	54
A.3.1	Arrester protective scheme	54
A.3.2	Arrester stresses, protection and insulation levels	55
A.3.3	Transformer valve side withstand voltages.....	59
A.3.4	Smoothing reactor withstand voltages.....	61
A.3.5	Results	62
Bibliography		64
Figure 1	– Possible arrester locations in a pole with two 12-pulse converters in series	11
Figure 2	– Possible arrester locations for a back-to-back converter station	12
Figure 3	– LCC HVDC converter station in a pole with one 12-pulse converter.....	13
Figure 4	– Continuous operating voltages at various locations (location identification according to Figure 3).....	15
Figure 5	– Operating voltage of a valve arrester (V), rectifier operation and definition of PCOV and CCOV.....	17
Figure 6	– Operating voltage of a mid-point arrester (M), rectifier operation	17
Figure 7	– Operating voltage of a converter bus arrester (CB), rectifier operation	17
Figure 8	– One pole of an LCC HVDC converter station	43

Figure A.1 – AC and DC arresters (LCC HVDC converter station in a pole with one 12-pulse converter)	52
Figure A.2 – Valve arrester stresses for slow-front overvoltages from AC side	53
Figure A.3 – Arrester V2 stress for slow-front overvoltage from AC side	53
Figure A.4 – Valve arrester stresses for earth fault between valve and upper bridge transformer bushing	54
Figure A.5 – Arrester V1 stress for earth fault between valve and upper bridge transformer bushing	54
Figure A.6 – AC and DC arresters (LCC HVDC converter station in a pole with two 12-pulse converters in series)	63
Table 1 – Symbol description	12
Table 2 – Arrester protection on the DC side: one 12-pulse converter (Figure 3)	34
Table 3 – Arrester protection on the DC side: two 12-pulse converters in series (Figure 1)	35
Table 4 – Events stressing arresters: one 12-pulse converter (Figure 3)	36
Table 5 – Types of arrester stresses for different events: one 12-pulse converter (Figure 3)	37
Table 6 – Arrester requirements	38
Table 7 – Representative overvoltages and required withstand voltages	39
Table 8 – Origin of overvoltages and associated frequency ranges	42

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INSULATION CO-ORDINATION –

Part 12: Application guidelines for LCC HVDC converter stations

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IEC 60071-12 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.

On the basis of technical experience gained and the development of HVDC, sufficient consensus has emerged to establish a series insulation co-ordination standard for HVDC system. The standard series for HVDC system belongs to IEC 60071 standard series, and 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.

This International Standard replaces, in conjunction with IEC 60071-11¹, IEC 60071-5 published in 2014. IEC 60071-5 provides basic principles and guidance for insulation coordination of high-voltage direct current (HVDC) converter stations. IEC 60071-11 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. IEC 60071-12 provides guidelines on the procedures for insulation co-ordination of line commutated converter (LCC) stations for high-voltage direct current (HVDC) project, whose aim is to give guidance for the determination of the specified withstand voltages for equipment.

IEC 60071-12 retains the technical content of IEC 60071-5 of the guidelines on the procedures for insulation coordination of LCC converter stations, and there are no essentially technical amendments. An example for LCC HVDC converter station in a pole with two 12-pulse converters in series is provided in annex. Examples of insulation co-ordination for controlled series capacitor converter (CSCC) and capacitor commutated converters (CCC) in IEC 60071-5 are no longer dealt with in this document.

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

Draft	Report on voting
99/368/FDIS	99/379/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.

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.

¹ Under preparation. Stage at the time of publication: IEC/CFDIS 60071-11:2022.

INSULATION CO-ORDINATION –

Part 12: Application guidelines for LCC HVDC converter stations

1 Scope

This part of IEC 60071 applies guidelines on the procedures for insulation co-ordination of line commutated converter (LCC) stations for high-voltage direct current (HVDC) project, whose aim is evaluating the overvoltage stresses on the converter station equipment subjected to combined DC, AC power frequency, harmonic and impulse voltages, and determining the specified withstand voltages for equipment.

This document deals only with metal-oxide surge arresters, without gaps, which are used in modern HVDC converter stations. The criteria for determining the protective levels of series and/or parallel combinations of surge arresters used to ensure optimal protection are also presented. Typical arrester protection schemes and stresses of arresters are presented.

Annex A contains examples of insulation co-ordination for LCC HVDC converters which support the concepts described in the main text, and the basic analytical techniques used.

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 60071-11², *Insulation co-ordination – Part 11 : Definitions, principles and rules for HVDC system*

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

IEC 60633, *High-voltage direct current (HVDC) transmission – Vocabulary*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definition

For the purposes of this document, the terms and definitions given in IEC 60071-11 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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² Under preparation. Stage at the time of publication: IEC/CFDIS 60071-11:2022.