



BSI Standards Publication

Terminology for voltage-sourced converters (VSC) for high-voltage direct current (HVDC) systems

National foreword

This British Standard is the UK implementation of EN 62747:2014+A1:2019. It is identical to IEC 62747:2014, incorporating corrigendum February 2015 and amendment 1:2019. It supersedes BS EN 62747:2014, which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to IEC text carry the number of the IEC amendment. For example, text altered by IEC amendment 1 is indicated by **A1** **A1**.

The UK participation in its preparation was entrusted to Technical Committee PEL/22, Power electronics.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Amendments/corrigenda issued since publication

Date	Text affected
31 March 2015	Implementation of IEC corrigendum February 2015: modulation index equation in Subclause 8.11 updated
31 May 2019	Implementation of IEC amendment 1:2019 with CENELEC endorsement A1:2019

English Version

Terminology for voltage-sourced converters (VSC) for
high-voltage direct current (HVDC) systems

Terminologie für Spannungszwischenkreis-
Stromrichter (VSC) für
Hochspannungsgleichstrom(HGÜ)-Systeme

Terminologie relative aux convertisseurs
de source de tension (VSC) des systèmes en
courant continu à haute tension (CCHT)

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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

The text of document 22F/301/CDV, future edition 1 of [IEC 62747](#), prepared by SC 22F "Power electronics for electrical transmission and distribution systems", of IEC/TC 22 "Power electronic systems and equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62747:2014.

The following dates are fixed:

- latest date by which the document has to be implemented at national level (dop) 2015-05-21
by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the document (dow) 2017-08-21
have to be withdrawn

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60146-1-1	NOTE	Harmonized as EN 60146-1-1.
IEC 60146-2	NOTE	Harmonized as EN 60146-2.
IEC 60747	NOTE	Harmonized in EN 60747 series.
IEC 60633	NOTE	Harmonized as EN 60633.
IEC 62501	NOTE	Harmonized as EN 62501.
IEC 62751-1	NOTE	Harmonized as EN 62751-1 ¹⁾ .
IEC 62751-2	NOTE	Harmonized as EN 62751-2 ¹⁾ .

Foreword to amendment A1

The text of document 22F/481/CDV, future IEC 62747/A1, prepared by SC 22F "Power electronics for electrical transmission and distribution systems" of IEC/TC 22 "Power electronic systems and equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62747:2014/A1:2019.

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- latest date by which the national standards conflicting with the document have (dow) 2022-02-28
to be withdrawn

1) To be published.

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Delete the following reference:

IEC 60633	NOTE	Harmonized as EN 60633
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Update the following references:

IEC 62751-1	NOTE	Harmonized as EN 62751-1
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IEC 62751-2	NOTE	Harmonized as EN 62751-2
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Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60027	series	Letter symbols to be used in electrical technology	EN 60027	series
IEC 60617	-	Graphical symbols for diagrams	-	-
IEC 60633	-	Terminology for high-voltage direct current (HVDC) transmission	EN 60633	-

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FOREWORD

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International Standard [IEC 62747](#) has been prepared by subcommittee 22F: Power electronics for electrical transmission and distribution systems, of IEC technical committee 22: Power electronic systems and equipment.

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

CDV	Report on voting
22F/301/CDV	22F/3 17A/RVC

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.

The contents of the corrigendum of February 2015 have been included in this copy.

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Terminology for voltage-sourced converters (VSC) for highvoltage direct current (HVDC) systems

1 Scope

This International Standard defines terms for the subject of self-commutated voltage-sourced converters used for transmission of power by high voltage direct current (HVDC).

The standard is written mainly for the case of application of insulated gate bipolar transistors (IGBTs) in voltage sourced converters (VSC) but may also be used for guidance in the event that other types of semiconductor devices which can both be turned on and turned off by control action are used.

Line-commutated and current-sourced converters for high-voltage direct current (HVDC) power transmission systems are specifically excluded from this standard.

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 60027 (all parts), *Letter symbols to be used in electrical technology*

IEC 60617, *Graphical symbols for diagrams*

 [IEC 60633](#), *Terminology for high-voltage direct current (HVDC) transmission* 

3 Symbols and abbreviations

3.1 List of letter symbols

 Essential terms and definitions necessary for the understanding of this standard are given here; other terminology is as per relevant parts of IEC 60747, and as per [IEC 60633](#) for certain specialized types of equipment which are found mainly on line-commutated HVDC schemes but may occasionally be included in VSC HVDC schemes. 

The list covers only the most frequently used symbols (see [Figure 1](#)). IEC 60027 shall be used for a more complete list of the symbols which have been adopted for static converters. See also other standards listed in the normative references and the bibliography.

U_d	direct voltage
U_{dc}	converter d.c. voltage
U_{dpe}	pole-to-earth direct voltage
U_{dpp}	pole-to-pole direct voltage
U_{dppN}	rated pole-to-pole direct voltage
U_{dpeN}	rated pole-to-earth direct voltage
U_L	line-to-line voltage on line side of interface transformer, r.m.s. value including harmonics

U_{Le}	line-to-earth voltage on line side of interface transformer, r.m.s. value including harmonics
U_{LN}	rated value of U_L
A_1 Text deleted A_1	
A_1 Text deleted A_1	
U_c	A_1 line-to-line voltage on converter side of interface transformer, r.m.s. value including harmonics A_1
A_1 Text deleted A_1	
U_{ce}	A_1 line-to-line voltage on converter side of interface transformer, r.m.s. value including harmonics A_1
A_1 Text deleted A_1	
U_{vtt}	A_1 voltage between terminals of a valve (any defined value) A_1
I_c	A_1 current on converter side of interface transformer, r.m.s. value including harmonics A_1
I_d	direct current (any defined value)
I_{dN}	rated direct current
I_L	current on line side of interface transformer, r.m.s. value including harmonics
I_{LN}	rated value of I_L
I_v	A_1 current through a valve A_1
A_1 Text deleted A_1	

3.2 List of subscripts

0 (zero)	at no load
e	earth
p	pole
N	rated value or at rated load
d	direct current or voltage
L	line side of interface transformer
c	A_1 converter side of interface transformer A_1
v	A_1 through or across one valve A_1
A_1 Text deleted A_1	
max	maximum
min	minimum