BS EN IEC 62751-1:2014+A2:2022

BSI Standards Publication

Power losses in voltage sourced converter (VSC) valves for high-voltage direct current (HVDC) systems

Part 1: General requirements

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National foreword

This British Standard is the UK implementation of EN 62751-1:2014+A2:2022. It is identical to IEC 62751-1:2014, incorporating amendment 1:2018 and amendment 2:2022. It supersedes BS EN 62751-1:2014+A1:2018, which is withdrawn.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.

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31 August 2018	Implementation of IEC amendment 1:2018 with CENELEC endorsement A1:2018
31 March 2023	Implementation of IEC amendment 2:2022 with CENELEC endorsement A2:2022

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EN 62751-1:2014+A2

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English Version

Power losses in voltage sourced converter (VSC) valves for high-voltage direct current (HVDC) systems — Part 1: General requirements (IEC 62751-1:2014)

Pertes de puissance dans les valves à convertisseur de source de tension (VSC) des systèmes en courant continu à haute tension (CCHT) — Partie 1: Exigences générales (IEC 62751-1:2014)

Bestimmung der Leistungsverluste in Spannungszwischenkreis-Stromrichtern (VSC) für Hochspannungsgleichstrom(HGÜ)-Systeme — Teil 1: Allgemeine Anforderungen (IEC 62751-1:2014)

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European foreword

The text of document 22F/302/CDV, future edition 1 of IEC 62751-1, 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 62751-1:2014.

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IEC 61803:1999	NOTE	Harmonised as EN 61803:1999.

Foreword to amendment A1

The text of document 22F/439A/CDV, future edition 1 of IEC 62751-1:2014/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 62751-1:2014/A1:2018.

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IEC 61803:1999/A1:2010	NOTE	Harmonized as EN 61803:1999/A1:2010 (not modified).
IEC 61803:1999/A2:2016	NOTE	Harmonized as EN 61803:1999/A2:2016 (not modified).

European foreword to Amendment 2

The text of document 22F/648/CDV, future IEC 62751-1/AMD2, 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 62751-1:2014/A2:2022.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2023-01-20
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Endorsement notice to Amendment 2

The text of the International Standard IEC 62751-1:2014/AMD2:2022 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 61803:2020 NOTE Harmonized as EN IEC 61803:2020 (not modified)

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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 When 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.

Publication	Year	Title	EN/HD	Year
IEC 60633	—	Terminology for high-voltage direct current (HVDC) transmission	EN 60633	—
IEC 60747-2	—	Semiconductor devices — Discrete devices - and integrated circuits — Part 2: Rectifier diodes		—
IEC 60747-9	2007	Semiconductor devices — Discrete devices — Part 9: Insulated-gate bipolar transistors (IGBTs)		—
IEC 62747	2014	Terminology for voltage-sourced converters (VSC) for high-voltage direct current (HVDC) systems	EN 62747	2014
ISO/IEC Guide 98-3	—	Uncertainty of measurement — Part 3: Guide-to the expression of uncertainty in measurement (GUM:1995)		—

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FOREWORD

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International Standard IEC 62751-1 has been prepared by subcommittee 22F: Power electronics for electrical transmission and distribution systems, of IEC technical committee 22: Power electronic systems and equipment.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62751series, published under the general title *Power losses in voltage sourced converter (VSC) valves for high-voltage direct current (HVDC) systems*, can be found on the IEC website.

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

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Power losses in voltage sourced converter (VSC) valves for high-voltage direct current (HVDC) systems —

Part 1:
General requirements

1 Scope

This part of IEC 62751 sets out the general principles for calculating the power losses in the converter valves of a voltage sourced converter (VSC) for high-voltage direct current (HVDC) applications, independent of the converter topology. Clauses 6 and 8 and subclauses 9.1, 9.2 and A.2.12 of the standard can also be used for calculating the power losses in the dynamic braking valves (where used) and as guidance for calculating the power losses of the valves for a STATCOM installation [A2] or unified power flow controller (UPFC) [A2].

Power losses in other items of equipment in the HVDC substation, apart from the converter valves, are excluded from the scope of this standard. Power losses in most equipment in a VSC substation can be calculated using similar procedures to those prescribed for HVDC systems with line-commutated converters (LCC) in IEC 61803. Annex A presents the main differences between LCC and VSC HVDC substations in so far as they influence the method for determining power losses of other equipment.

This standard does not apply to converter valves for line-commutated converter HVDC systems.

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 60633, *Terminology for high-voltage direct current (HVDC) transmission*

IEC 60747-2, *Semiconductor devices — Discrete devices and integrated circuits — Part 2: Rectifier diodes*

IEC 60747-9:2007, *Semiconductor devices — Discrete devices — Part 9: Insulated-gate bipolar transistors (IGBTs)*

IEC 62747:2014, *Terminology for voltage-sourced converters (VSC) for high-voltage direct current (HVDC) systems*

[A1] ISO/IEC Guide 98-3, *Uncertainty of measurement — Part 3: Guide to the expression of uncertainty in measurement (GUM:1995)* [A1]

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60633, IEC 62747, IEC 60747-2, IEC 60747-9 as well as the following apply.

NOTE 1 Related terms and definitions can also be found in IEC TR 62543, IEC 62751-2 and in the other relevant parts of the IEC 60747 series.

NOTE 2 Throughout this standard, the term “insulated gate bipolar transistor (IGBT)” is used to indicate a turn-off semiconductor device; however, the standard is equally applicable to other types of turn-off semiconductor devices such as the GTO, IGCT, ETO, IEGT, etc.

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