SLOVENSKI STANDARD
SIST EN IEC 61803:2021

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Nadomešča:
SIST EN 61803:2001
SIST EN 61803:2001/A1:2011
SIST EN 61803:2001/A2:2016

Ugotavljanje močnostnih izgub v visokonapetostnih enosmernih (HVDC) pretvorniških postajah s pretvorniki s komutiranjem (IEC 61803:2020)

Determination of power losses in high-voltage direct current (HVDC) converter stations with line-commutated converters (IEC 61803:2020)

Bestimmung der Leistungsverluste in Hochspannungsgleichstrom-(HGÜ-)Stromrichterstationen mit netzgeführten Stromrichtern (IEC 61803:2020)

Détermination des pertes en puissance dans les postes de conversion en courant continu à haute tension (CCHT) munis de convertisseurs commutés par la ligne (IEC 61803:2020)

Ta slovenski standard je istoveten z: **EN IEC 61803:2020**

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29.200	Usmerniki. Pretvorniki. Stabilizirano električno napajanje	Rectifiers. Convertors. Stabilized power supply

SIST EN IEC 61803:2021 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

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EN IEC 61803

December 2020

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Supersedes EN 61803:1999 and all of its amendments and corrigenda (if any)

English Version

Determination of power losses in high-voltage direct current (HVDC) converter stations with line-commutated converters (IEC 61803:2020)

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This European Standard was approved by CENELEC on 2020-11-23. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 22F/563/CDV, future edition 2 of IEC 61803, 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 IEC 61803:2020.

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) 2021-08-23
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2023-11-23

This document supersedes EN 61803:1999 and all of its amendments and corrigenda (if any).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 61803:2020 was approved by CENELEC as a European Standard without any modification.

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.

Publication	Year	Title	EN/HD	Year
IEC 60076-1	-	Power transformers - Part 1: General	EN 60076-1	-
IEC 60076-6	-	Power transformers - Part 6: Reactors	EN 60076-6	-
IEC 60633	-	High-voltage direct current (HVDC) transmission - Vocabulary	EN IEC 60633	-
IEC 60700-1	2015	Thyristor valves for high voltage direct current (HVDC) power transmission - Part 1: Electrical testing	EN 60700-1	2015
IEC 60871-1	-	Shunt capacitors for a.c. power systems having a rated voltage above 1 000 V - Part 1: General	EN 60871-1	-

IEC 61803

Edition 2.0 2020-10

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Determination of power losses in high-voltage direct current (HVDC) converter stations with line-commutated converters

Détermination des pertes en puissance dans les postes de conversion en courant continu à haute tension (CCHT) munis de convertisseurs commutés par la ligne

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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DETERMINATION OF POWER LOSSES IN HIGH-VOLTAGE DIRECT CURRENT (HVDC) CONVERTER STATIONS WITH LINE-COMMUTATED CONVERTERS

FOREWORD

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International Standard IEC 61803 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 second edition cancels and replaces the first edition published in 1999, Amendment 1:2010 and Amendment 2:2016. This edition constitutes a technical revision.

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

a) to facilitate the application of this document and to ensure its quality remains consistent, 5.1.8 and 5.8 have been reviewed, taking into consideration that the present thyristor production technology provides considerably less thyristor parameters dispersion comparing with the situation in 1999 when the first edition of IEC 61803 was developed, and therefore the production records of thyristors can be used for the power losses calculation;

b) the calculation of the total station load losses (cases D1 and D2 in Annex C) has been corrected.

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

CDV	Report on voting
22F/563/CDV	22F/580A/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

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

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://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.

DETERMINATION OF POWER LOSSES IN HIGH-VOLTAGE DIRECT CURRENT (HVDC) CONVERTER STATIONS WITH LINE-COMMUTATED CONVERTERS

1 Scope

This document applies to all line-commutated high-voltage direct current (HVDC) converter stations used for power exchange (power transmission or back-to-back installation) in utility systems. This document presumes the use of 12-pulse thyristor converters but can, with due care, also be used for 6-pulse thyristor converters.

In some applications, synchronous compensators or static var compensators (SVC) may be connected to the AC bus of the HVDC converter station. The loss determination procedures for such equipment are not included in this document.

This document presents a set of standard procedures for determining the total losses of an HVDC converter station. The procedures cover all parts, except as noted above, and address no-load operation and operating losses together with their methods of calculation which use, wherever possible, measured parameters.

Converter station designs employing novel components or circuit configurations compared to the typical design assumed in this document, or designs equipped with unusual auxiliary circuits that could affect the losses, are assessed on their own merits.

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 60076-1, *Power transformers – Part 1: General*

IEC 60076-6, *Power transformers – Part 6: Reactors*

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

IEC 60700-1:2015, *Thyristor valves for high voltage direct current (HVDC) power transmission – Part 1: Electrical testing*

IEC 60871-1, *Shunt capacitors for a.c. power systems having a rated voltage above 1 000 V – Part 1: General*

3 Terms, definitions and symbols

For the purposes of this document, the terms and definition given in IEC 60633 and the following apply.

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

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1 Terms and definitions

3.1.1
auxiliary losses
electric power required to feed the converter station auxiliary loads

Note 1 to entry: The auxiliary losses depend on the number of converter units used and whether the station is in no-load operation or carrying load, in which case the auxiliary losses depend on the load level.

3.1.2
equipment no-load operation losses
losses produced in an item of equipment with the converter station energised but with the converters blocked and all station service loads and auxiliary equipment connected as required for immediate pick-up of load to specified minimum power

3.1.3
load level
direct current, direct voltage, firing angle, AC voltage, and converter transformer tap-changer position at which the converter station is operating

3.1.4
equipment operating losses
losses produced in an item of equipment at a given load level with the converter station energised and the converters operating

3.1.5
rated load
load related to operation at nominal values of DC current, DC voltage, AC voltage and converter firing angle

Note 1 to entry: The AC system shall be assumed to be at nominal frequency, and its 3-phase voltages are nominal and balanced. The position of the tap-changer of the converter transformer and the number of AC filters and shunt reactive elements connected shall be consistent with operation at rated load, coincident with nominal conditions.

3.1.6
total station no-load operation losses
sum of all equipment no-load operation losses (3.1.2) and corresponding auxiliary losses (3.1.1)

3.1.7
total station operating losses
sum of all equipment operating losses (3.1.4) and corresponding auxiliary losses (3.1.1) at a particular load level

Note 1 to entry: An illustrative example using total station operating losses and corresponding loss evaluation is given in Annex C, case D1.

3.1.8
total station load losses
difference between total station operating losses (3.1.7) and total station no-load operation losses (3.1.6)

Note 1 to entry: Such calculated total station load losses are considered as being quantitatively equivalent to load losses as in conventional AC substation practice.