SLOVENSKI STANDARD
SIST EN 61803:2001

01-junij-2001

Determination of power losses in high-voltage direct current (HVDC) converter stations (IEC 61803:1999)

Determination of power losses in high-voltage direct current (HVDC) converter stations

Bestimmung der Leistungsverluste in Hochspannungsgleichstrom- (HGÜ-) Stromrichterstationen

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Détermination des pertes en puissance dans les postes de conversion en courant continu à haute tension (CCHT)

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Ta slovenski standard je istoveten z: **EN 61803:1999**

ICS:

29.200	Usmerniki. Pretvorniki. Stabilizirano elektriļ no napajanje	Rectifiers. Convertors. Stabilized power supply

SIST EN 61803:2001 **en**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61803

April 1999

ICS 29.200

English version

Determination of power losses in high-voltage direct current (HVDC) converter stations (IEC 61803:1999)

Détermination des pertes en puissance dans les postes de conversion en courant continu à haute tension (CCHT) (CEI 61803:1999)

Bestimmung der Leistungsverluste in Hochspannungsgleichstrom (HGÜ)-Stromrichter-Stationen (IEC 61803:1999)

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This European Standard was approved by CENELEC on 1999-04-01. 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 Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

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SIST EN 61803:2001

Foreword

The text of document 22F/51/FDIS, future edition 1 of IEC 61803, prepared by SC 22F, Power electronics for electrical transmission and distribution systems, of IEC TC 22, Power electronics, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61803 on 1999-04-01.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2000-01-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2002-04-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annexes A and ZA are normative and annexes B and C are informative.
Annex ZA has been added by CENELEC.

Endorsement notice

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The text of the International Standard IEC 61803:1999 was approved by CENELEC as a European Standard without any modification.

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Annex ZA (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE: When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60076-1 (mod)	1993	Power transformers Part 1: General	EN 60076-1	1997
IEC 60289 (mod)	1988	Reactors	EN 60289	1994
IEC 60633	1998	Terminology for high-voltage direct current (HVDC) transmission	EN 60633	1999
IEC 60700-1	1998	Thyristor valves for high voltage direct current (HVDC) power transmission Part 1: Electrical testing	EN 60700-1	1998
IEC 60747-6	1983	Semiconductor devices - Discrete devices Part 6: Thyristors	-	-
IEC 60871-1	1997	Shunt capacitors for a.c. power systems having a rated voltage above 1 kV Part 1: General performance, testing and rating - Safety requirements - Guide for installation and operation	EN 60871-1	1997

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NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI
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Première édition
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

DETERMINATION OF POWER LOSSES IN HIGH-VOLTAGE DIRECT CURRENT (HVDC) CONVERTER STATIONS

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.

3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.

4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.

6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

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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 electronics.

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

FDIS	Report on voting
22F/51/FDIS	22F/56/RVD

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

Annex A forms an integral part of this standard.

Annexes B and C are for information only.

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DETERMINATION OF POWER LOSSES IN HIGH-VOLTAGE DIRECT CURRENT (HVDC) CONVERTER STATIONS

1 Scope

This International Standard applies to all line-commutated high-voltage direct current (HVDC) converter stations used for power exchange in utility systems. This standard 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 a.c. bus of the HVDC converter station. The loss determination procedures for such equipment are not included in this standard.

This standard presents a set of standard procedures for determining the total losses of an HVDC converter station. Typical HVDC equipment is shown in figure 1. 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.

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

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2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60076-1:1993, *Power transformers – Part 1: General*

IEC 60289:1988, *Reactors*

IEC 60633:1998, *Terminology for high-voltage direct current (HVDC) transmission*

IEC 60700-1:1998, *Thyristor valves for high voltage direct current (HVDC) power transmission – Part 1: Electrical testing*

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IEC 60747-6:1983, *Semiconductor devices – Discrete devices – Part 6: Thyristors*

IEC 60871-1:1997, *Shunt capacitors for a.c. power systems having a rated voltage above 1 000 V – Part 1: General performance, testing and rating – Safety requirements – Guide for installation and operation*

3 Definitions and symbols

For the purpose of this International Standard, the following definitions apply:

3.1 Definitions

3.1.1
auxiliary losses
the electric power required to feed the converter station auxiliary loads. The auxiliary losses depend on 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
no-load operation losses
the losses produced in an item of equipment with the converter station energized but with the converters blocked and all station service loads and auxiliary equipment connected as required for immediate pick-up of load

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3.1.3
load level
this term specifies the direct current, direct voltage, firing angle, a.c. voltage, and converter transformer tap-changer position at which the converter station is operating

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

3.1.5
rated load
this load is related to operation at nominal values of d.c. current, d.c. voltage, a.c. voltage and converter firing angle. The a.c. 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 a.c. filters and shunt reactive elements connected shall be consistent with operation at rated load, coincident with nominal conditions

3.1.6
total station losses
the total station loss is the sum of all operating or no-load operation losses and the corresponding auxiliary losses