SLOVENSKI STANDARD
SIST EN 61166:1995

01-december-1995

High-voltage alternating current circuit-breakers - Guide for seismic qualification of high-voltage alternating current circuit-breakers (IEC 1166:1993)

High-voltage alternating current circuit-breakers - Guide for seismic qualification of high-voltage alternating current circuit-breakers

Hochspannungs-Wechselstrom-Leistungsschalter - Leitfaden für die Erdbeben-Qualifikation von Hochspannungs-Wechselstrom-Leistungsschaltern

Disjoncteurs à courant alternatif à haute tension - Guide pour la qualification sismique des disjoncteurs à courant alternatif à haute tension

Ta slovenski standard je istoveten z: **EN 61166:1993**

ICS:

29.130.10	Visokonapetostne stikalne in krmilne naprave	High voltage switchgear and controlgear

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ENGLISH VERSION

High-voltage alternating current circuit-breakers
Guide for seismic qualification of high-voltage alternating current circuit-breakers
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(IEC 1166:1993)

This European Standard was approved by CENELEC on 1993-07-06.
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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.

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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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FOREWORD

The text of document 17A(CO)236, as prepared by sub-committee 17A: High-voltage switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear, was submitted to the IEC-CENELEC parallel vote in May 1992.

The reference document was approved by CENELEC as EN 61166 on 6 July 1993.

The following dates were fixed:

- latest date of publication of an identical national standard	(dop)	1994-07-01
- latest date of withdrawal of conflicting national standards	(dow)	1994-07-01

Annexes designated "normative" are part of the body of the standard. In this standard, annexes A and ZA are normative.

ENDORSEMENT NOTICE

The text of the International Standard IEC 1166:1993 was approved by CENELEC as a European Standard without any modification.

ANHANG ZA (normativ)

ANDERE IN DIESER NORM ZITIERTE INTERNATIONALE PUBLIKATIONEN MIT DEN VERWEISUNGEN DER ENTSPRECHENDEN EUROPAISCHEN PUBLIKATIONEN

Wenn die internationale Publikation durch gemeinsame Abänderungen von CENELEC geändert wurde, durch (mod) angegeben, gelten die entsprechenden EN/HD.

IEC-Publikation	Datum	Titel	EN/HD	Datum
50(441)	1984	International Electrotechnical Vocabulary (IEV) - Part 441: Chapter 441: Switchgear, controlgear and fuses	-	-
56, mod	1987	High-voltage alternating-current circuit-breakers	HD 348 S4	1991
68-1	1988	Environmental testing Part 1: General and guidance	HD 323.1 S2	1988
68-2-6	1982	Part 2: Tests - Test Fc and guidance: Vibration (sinusoidal)	HD 323.2.6 S2*	1988
68-2-47	1982	Mounting of components, equipment and other articles for dynamic tests including shock (Ea), bump (Eb), vibration (Fc and Fd) and steady-state acceleration (Ga) and guidance	EN 60068-2-47	1993
68-2-57	1989	Test Ff: Vibration - Time-history method	EN 60068-2-57	1993
68-3-3	1991	Part 3: Guidance - Guidance - Seismic test methods for equipments	EN 60068-3-3	1993

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* HD 323.2.6 S2 enthält A1:1983 + A2:1985 zu IEC 68-2-6

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High-voltage alternating current circuit-breakers – Guide for seismic qualification of high-voltage alternating current circuit-breakers

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

HIGH-VOLTAGE ALTERNATING CURRENT CIRCUIT-BREAKERS – GUIDE FOR SEISMIC QUALIFICATION OF HIGH-VOLTAGE ALTERNATING CURRENT CIRCUIT-BREAKERS

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 cooperation 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, prepared by technical committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.

3) They have the form of recommendations for international use 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.

This International Standard IEC 1166 has been prepared by IEC by sub-committee 17A: High-voltage switchgear and controlgear, of IEC technical committee 17: Switchgear and controlgear.

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

DIS	Report on Voting
17A(CO)236	17A(CO)244

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 International Standard.

HIGH-VOLTAGE ALTERNATING CURRENT CIRCUIT-BREAKERS – GUIDE FOR SEISMIC QUALIFICATION OF HIGH-VOLTAGE ALTERNATING CURRENT CIRCUIT-BREAKERS

1 Scope and object

This International Standard applies only to ground mounted high-voltage (HV) circuit-breakers, the supporting structures of which are rigidly connected with the ground, and does not cover the seismic qualification of circuit-breakers in metal enclosed switchgear.

The seismic qualification of the HV circuit-breakers shall take into account any auxiliary and control equipment which is mounted on the circuit-breaker structure. If the auxiliary and control equipment is mounted on a separate structure, it may be qualified independently.

This standard is a guide providing procedures to seismically qualify HV alternating-current ground mounted circuit-breakers. It is mainly based on IEC 68-3-3, which in turn refers to IEC 68-1, IEC 68-2-6, IEC 68-2-47 and IEC 68-2-57.

The seismic qualification of a circuit-breaker is only performed upon request.

This standard specifies seismic severity levels and gives a choice of methods that can be applied to demonstrate the performance of HV circuit-breakers for which seismic qualification is required.

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 50(441): 1984, *International Electrotechnical Vocabulary (IEV), Chapter 441: Switchgear, controlgear and fuses*

IEC 56: 1987, High-voltage alternating-current circuit-breakers

IEC 68-1: 1988, *Environmental testing – Part 1: General and guidance*

IEC 68-2-6: 1982, *Environmental testing – Part 2: Tests – Test Fc and guidance: Vibration (sinusoidal)*

IEC 68-2-47: 1982, *Environmental testing – Part 2: Tests – Mounting of components, equipment and other articles for dynamic tests including shock (Ea), bump (Eb), vibration (Fc and Fd) and steady-state acceleration (Ga) and guidance*

IEC 68-2-57: 1989, *Environmental testing – Part 2: Tests – Test Ff. Vibration – Time history method.*

IEC 68-3-3: 1991, *Environmental testing – Part 3: Background information. Seismic test methods for equipment.*

3 Definitions

For definition of the terms used in this International Standard refer to IEC 68-3-3.

4 Seismic qualification requirements

The seismic qualification should demonstrate the circuit-breaker's ability to withstand seismic stress and to maintain its specified function, both during and after the seismic event.

The most commonly used methods are:

a) qualification by test;

b) qualification by combined test and analysis.

NOTE - Qualification by pure analysis is acceptable if sufficient information on physical parameters (e.g. damping coefficient) and on the functional behaviour of the circuit-breaker is available.

5 Severities

The severity levels shall be chosen from table 1.

Table 1 – Seismic qualification levels - horizontal severities

Qualification level	Required response spectrum	Zero period acceleration (ZPA) m/s²
AF5	Figure 1	5
AF3	Figure 2	3
AF2	Figure 3	2

For vertical severities the direction factor (D) is 0,5 (see IEC 68-3-3).

NOTES

1 The required response spectrum of qualification level AF5 covers, in the range of predominant seismic frequency of 1 Hz to 35 Hz, the following response spectra: Endesa, Edelca, USA/NRC RG 1.60, Newmark Design Response Spectra (scaled to 5 m/s²), Nema (5 m/s² max. foundation acceleration), Dept. of Water & Power Los Angeles, San Diego SDG & E Imperial Substation.

2 Information on the correlation between seismic qualification levels and different seismic scales is given in 8.2.4 of IEC 68-3-3.

The selected qualification level should be in accordance with expected earthquakes at maximum ground motions for the location of installation. This level corresponds to S2 earthquake (see 3.24 of IEC 68-3-3).