

SLOVENSKI STANDARD

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Nadomešča:

SIST HD 384.5.551 S1:2004

Nizkonapetostne električne inštalacije - 5-55. del: Izbira in namestitvev električne opreme - Druga oprema - 551. točka: Nizkonapetostni generatorji (IEC 60364-5-55:2001/A2:2008 (Točka 551))

Low-voltage electrical installations -- Part 5-55: Selection and erection of electrical equipment - Other equipment -- Clause 551: Low-voltage generating sets

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Errichten von Niederspannungsanlagen -- Teil 5-55: Auswahl und Errichtung elektrischer Betriebsmittel - Andere Betriebsmittel - Abschnitt 551:

Niederspannungsstromerzeugungseinrichtungen

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Installations électriques à basse tension -- Partie 5-55: Choix et mise en oeuvre des matériels électriques - Autres matériels -- Article 551: Groupes générateurs à basse tension

Ta slovenski standard je istoveten z: HD 60364-5-551:2010

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English version

**Low-voltage electrical installations -
Part 5-55: Selection and erection of electrical equipment -
Other equipment -
Clause 551: Low-voltage generating sets
(IEC 60364-5-55:2001/A2:2008 (CLAUSE 551))**

Installations électriques à basse
tension -
Partie 5-55: Choix et mise en oeuvre
des matériels électriques -
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basse tension
(CEI 60364-5-55:2001/A2:2008
(CLAUSE 551))

Errichten von Niederspannungsanlagen -
Teil 5-55: Auswahl und Errichtung elektrischer
Betriebsmittel -
Andere Betriebsmittel -
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Up-to-date lists and bibliographical references concerning such national implementations may be obtained on application to the Central Secretariat or to any CENELEC member.

This Harmonization Document exists in three official versions (English, French, German).

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

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

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Foreword

The text of the International Standard IEC 60364-5-55:2001/A2:2008, Clause 551, prepared by IEC TC 64, Electrical installations and protection against electric shock, was submitted to the CENELEC Unique Acceptance Procedure and was approved by CENELEC as HD 60364-5-551 on 2009-10-01.

This document supersedes HD 384.5.551 S1:1997.

In this standard, the common modifications to the International Standard are indicated by a vertical line in the left margin of the text.

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

The following dates were fixed:

- latest date by which the HD has to be implemented at national level by publication of a harmonized national standard or by endorsement (dop) 2010-10-01
- latest date by which the national standards conflicting with the HD have to be withdrawn (dow) 2012-10-01

For this Harmonization Document the informative Annex A of IEC 60364-5-55:2001/A2:2008 shall be disregarded and has been replaced by the normative Annex ZA, *Special national conditions*.

Annexes ZA and ZB have been added by CENELEC.

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551 Low-voltage generating sets

551.1 Scope

This clause provides requirements for the selection and erection of low-voltage and extra-low voltage generating sets intended to supply, either continuously or occasionally, all or part of the installation. Requirements are also included for installations with the following supply arrangements:

- supply to an installation which is not connected to a system for distribution of electricity to the public;
- supply to an installation as an alternative to a system for distribution of electricity to the public;
- supply to an installation in parallel with a system for distribution of electricity to the public supply;
- appropriate combinations of the above.

This part does not apply to self-contained items of extra-low voltage electrical equipment which incorporate both the source of energy and the energy-using load and for which a specific product standard exists that includes the requirements for electrical safety.

NOTE Requirements of the electricity distributor should be ascertained before a generating set is installed in an installation that is connected to a system for distribution of electricity to the public.

551.1.1 Generating sets with the following power sources are considered:

- combustion engines;
 - turbines;
 - electric motors;
 - photovoltaic cells (HD 60364-7-712 also applies);
 - electrochemical accumulators;
 - other suitable sources.
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551.1.2 Generating sets with the following electrical characteristics are considered:

- mains-excited and separately excited synchronous generators;
- mains-excited and self-excited asynchronous generators;
- mains-commutated and self-commutated static converters with or without by-pass facilities;
- generating sets with other suitable electrical characteristics.

551.1.3 The use of generating sets for the following purposes is considered:

- supply to permanent installations;
- supply to temporary installations;
- supply to mobile equipment which is not connected to a permanent installation;
- supply to mobile units (HD 60364-7-717 also applies).

551.2 General requirements

551.2.1 The means of excitation and commutation shall be appropriate for the intended use of the generating set and the safety and proper functioning of other sources of supply shall not be impaired by the generating set.

NOTE See 551.7 for particular requirements where the generating set may operate in parallel with a system for the distribution of electricity to the public.

551.2.2 The prospective short-circuit current and prospective earth fault current shall be assessed for each source of supply or combination of sources which can operate independently of other sources or combinations. The short-circuit breaking capacity of protective devices within the installation and, where appropriate, connected to a system for distribution of electricity to the public, shall not be exceeded for any of the intended methods of operation of the sources.

NOTE Attention should be given to the power factor specified for protective devices in the installation.

551.2.3 The capacity and operating characteristics of the generating set shall be such that danger or damage to equipment does not arise after the connection or disconnection of any intended load as a result of the deviation of the voltage or frequency from the intended operating range. Means shall be provided to automatically disconnect such parts of the installation as may be necessary if the capacity of the generating set is exceeded.

NOTE 1 Attention should be given to the size of individual loads as a proportion of the capacity of the generating set and to motor starting currents.

NOTE 2 Attention should be given to the power factor specified for protective devices in the installation.

NOTE 3 The installation of a generating set within an existing building or installation may change the conditions of external influence for the installation (see HD 60364-1), for example by the introduction of moving parts, parts at high temperature or by the presence of inflammable fluids and noxious gases, etc.

551.2.4 Provision for isolation shall meet the requirements of Clause 537 for each source or combination of sources of supply.

551.3 Protective measure: extra-low voltage provided by SELV and PELV

551.3.1 Additional requirements for SELV and PELV where the installation is supplied from more than one source

Where a SELV or PELV system may be supplied by more than one source, the requirements of 414.3 of HD 60364-4-41 shall apply to each source. Where one or more of the sources is earthed, the requirements for PELV systems in 414.4 of HD 60364-4-41 shall apply.

If one or more of the sources does not meet the requirements of 414.3, the system shall be treated as a FELV system and the requirements of 411.7 of HD 60364-4-41 shall apply.

551.3.2 Additional requirements where it is necessary to maintain the supply to an extra-low voltage system

Where it is necessary to maintain the supply to an extra-low voltage system following the loss of one or more sources of supply, each source of supply or combination of sources of supply which can operate independently of other sources or combinations shall be capable of supplying the intended load of the extra-low voltage system. Provisions shall be made that the loss of low-voltage supply to an extra-low voltage source does not lead to danger or damage to other extra-low voltage equipment.

NOTE Such precautions can be necessary in supplies for safety services (see Part 56¹⁾ of IEC 60364).

551.4 Fault protection (protection against indirect contact)

551.4.1 Fault protection shall be provided for the installation in respect of each source of supply or combination of sources of supply that can operate independently of other sources or combinations of sources.

¹⁾ HD 60364-5-56 under preparation.

The fault protective provisions shall be selected or precautions shall be taken to ensure that where fault protective provisions are achieved in different ways within the same installation or part of an installation according to the active sources of supply, no influence shall occur or conditions arise that could impair the effectiveness of the fault protective provisions.

NOTE This might, for example, require the use of a transformer providing electrical separation between parts of the installation using different system earthing.

551.4.2 The generating set shall be connected so that any provision within the installation for protection by residual current devices in accordance with HD 60364-4-41 remains effective for every intended combination of sources of supply.

NOTE Connection of live parts of the generator with earth can affect the protective measures.

551.4.3 Protection by automatic disconnection of supply

551.4.3.1 General

Where the protective measure automatic disconnection of supply is used for protection against electric shock, the requirements of Clause 411 of HD 60364-4-41 apply, except as modified for the particular cases given in 551.4.3.2 or 551.4.3.3.

551.4.3.2 Additional requirements for installations where the generating set provides a supply as a switched alternative to the normal supply to the installation

Protection by automatic disconnection of supply shall not rely upon the connection to the earthed point of the distribution system when the generator is operating as a switched alternative. A suitable means of earthing shall be provided.

551.4.3.3 Additional requirements for installations incorporating static converters

551.4.3.3.1 Where fault protection for parts of the installation supplied by the static converter relies upon the automatic closure of the by-pass switch and the operation of protective devices on the supply side of the by-pass switch is not within the time required by Clause 411 of HD 60364-4-41, supplementary equipotential bonding shall be provided between simultaneously accessible exposed-conductive-parts and extraneous-conductive-parts on the load side of the static converter in accordance with 415.2 of HD 60364-4-41.

The resistance of supplementary equipotential bonding conductors required between simultaneously accessible conductive parts shall fulfill the following condition in case of a.c.:

$$R \leq \frac{50 V}{I_a}$$

where

I_a is the maximum earth fault current which can be supplied by the static converter alone for a period of up to 5 s.

NOTE Where such equipment is intended to operate in parallel with a system for distribution of electricity to the public, the requirements of 551.7 also apply.

551.4.3.3.2 Precautions shall be taken or equipment shall be selected so that the correct operation of protective devices is not impaired by d.c. currents generated by a static converter or by the presence of filters.

551.4.3.3.3 A means of isolation shall be installed on both sides of a static converter.

This requirement does not apply on the power source side of a static converter which is integrated in the same enclosure as the power source.

551.5 Protection against overcurrent

551.5.1 Where overcurrent protection of the generating set is required, it shall be located as near as practicable to the generator terminals.

NOTE The contribution to the prospective short-circuit current by a generating set can be time-dependent and can be much less than the contribution made by a system where the source is a mv/lv transformer.

551.5.2 Where a generating set is intended to operate in parallel with another source of supply, including a supply from a system for distribution of electricity to the public, or where two or more generating sets may operate in parallel, harmonic currents shall be limited so that the thermal rating of conductors is not exceeded.

The effects of harmonic currents may be limited as follows:

- the selection of generating sets with compensated windings;
- the provision of a suitable impedance in the connection to generator star points;
- the provision of switches which interrupt the circuit but which are interlocked so that at all times fault protection is not impaired;
- the provision of filtering equipment;
- other suitable means.

NOTE 1 Consideration should be given to the maximum voltage which may be produced across an impedance connected to limit harmonics.

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NOTE 2 Monitoring equipment complying with EN 61557-12 provides information on level of disturbances resulting from the presence of harmonics.

551.6 Additional requirements for installations where the generating set provides a supply as a switched alternative to the normal supply to the installation

551.6.1 Precautions complying with the relevant requirements of IEC 60364-5-53 for isolation shall be taken, so that the generator cannot operate in parallel with the public supply system for distribution of electricity to the public. Suitable precautions may include:

- an electrical, mechanical or electro-mechanical interlock between the operating mechanisms or control circuits of the change-over switching devices;
- a system of locks with a single transferable key;
- a three-position break-before-make change-over switch;
- an automatic change-over switching device with a suitable interlock;
- other means providing equivalent security of operation.

NOTE Isolation should include supplies to the control circuits of the generator.

551.6.2 For TN-S systems where the neutral is not switched, any residual current device shall be positioned to avoid incorrect operation due to the existence of any parallel neutral-earth path.

NOTE 1 It can be desirable in TN systems to disconnect the neutral of the installation from the neutral or PEN of the system for distribution of electricity to the public to avoid disturbances such as induced voltage surges caused by lightning.

NOTE 2 See also 444.4.7 of HD 60364-4-444.

551.7 Additional requirements for installations where the generating set may operate in parallel with other sources including systems for distribution of electricity to the public

551.7.1 Where a generating set is used as an additional source of supply in parallel with another source, protection against thermal effects in accordance with HD 60364-4-42 and protection against overcurrent in accordance with part HD 60364-4-43 shall remain effective in all situations.

Except where an uninterruptible power supply is provided to supply specific items of current using equipment within the final circuit to which it is connected, such a generating set shall be installed on the supply side of all the protective devices for the final circuits of the installation.

551.7.2 A generating set used as an additional source of supply in parallel with another source shall be installed:

- on the supply side of all the protective devices for the final circuits of the installation, or
- on the load side of all the protective devices for a final circuit of the installation, but in this case all the following additional requirement shall be fulfilled:

- (i) the conductors of the final circuit shall meet the following requirement:

$$I_z \geq I_n + I_g$$

where

I_z is the current-carrying capacity of the final circuit conductors;

I_n is the rated current of the protective device of the final circuit;

I_g is the rated output current of the generating set;

and

- (ii) a generating set shall not be connected to a final circuit by means of a plug and socket; and
- (iii) a residual current device providing protection of the final circuit in accordance with Clause 411 or Clause 415 of HD 60364-4-41 shall disconnect all live conductors including the neutral conductor; and
- (iv) the line and neutral conductors of the final circuit and of the generating set shall not be connected to earth downstream of the protective device of the final circuit.

NOTE Where the generating set is installed in a final circuit on the load side of all the protective devices for that final circuit, except where the protective devices for the final circuit disconnect the line and the neutral conductors, the disconnection time in accordance with 411.3.2 of HD 60364-4-41 is the combination of the disconnection time of the protective device for the final circuit and the time taken for the output voltage of the generating set to be reduced to less than 50 V.

551.7.3 In selecting and using a generating set to run in parallel with another source, including the system for distribution of electricity to the public, care shall be taken to avoid adverse effects to that system and to other installations in respect of power factor, voltage changes, harmonic distortion, d.c. current injection, unbalance, starting, synchronizing or voltage fluctuation effects. In the case of a system for distribution of electricity to the public, the distributor shall be consulted in respect of particular requirements. Where synchronization is necessary, the use of automatic synchronizing systems which consider frequency, phase and voltage is to be preferred.