
Agregati za proizvodnjo izmeničnega toka, gnani z batnim motorjem z notranjim zgorevanjem - 11. del: - Dimamični neprekinitveni napajalni sistemi - Zahtevane lastnosti in preskusne metode (IEC 88528-11:2004)

Reciprocating internal combustion engine driven alternating current generating sets -- Part 11: Rotary uninterruptible power systems - Performance requirements and test methods

Stromerzeugungsaggregate mit Hubkolben-Verbrennungsmotoren -- Teil 11: Dynamische, unterbrechungsfreie Stromversorgung - Leistungsanforderungen und Prüfverfahren

[SIST EN 88528-11:2004](https://standards.iteh.ai/catalog/standards/sist/dc4fec7e-881a-46c2-bba5-4a1010101010/sist-en-88528-11-2004)

Groupes électrogènes à courant alternatif entraînés par moteurs alternatifs à combustion interne -- Partie 11: Alimentations sans interruption à accumulation d'énergie cinétique - Prescriptions de performances et méthodes d'essai

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EUROPEAN STANDARD

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NORME EUROPÉENNE

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**Reciprocating internal combustion engine driven
alternating current generating sets
Part 11: Rotary uninterruptible power systems -
Performance requirements and test methods
(IEC 88528-11:2004)**

Groupes électrogènes à courant alternatif
entraînés par moteurs alternatifs
à combustion interne
Partie 11: Alimentations sans interruption
à accumulation d'énergie cinétique -
Prescriptions de performances
et méthodes d'essai
(CEI 88528-11:2004)

Stromerzeugungsaggregate
mit Hubkolben-Verbrennungsmotoren
Teil 11: Dynamische, unterbrechungsfreie
Stromversorgung -
Leistungsanforderungen
und Prüfverfahren
(IEC 88528-11:2004)

[SIST EN 88528-11:2004](https://standards.iteh.ai/catalog/standards/sist/dc4fec7e-881a-46c2-bba5-b44b93ab3d8a/sist-en-88528-11-2004)

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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

Foreword

The text of document 2/1275/FDIS, future edition 1 of IEC 88528-11, prepared by IEC TC 2, Rotating machinery and ISO TC 70, Internal combustion engines, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 88528-11 on 2004-04-01.

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) 2005-01-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2007-04-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 88528-11:2004 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

The following referenced documents are indispensable for the application 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 Where an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60034-1	- ¹⁾	Rotating electrical machines Part 1: Rating and performance	-	-
IEC 60034-22	1996	Part 22: AC generators for reciprocating internal combustion (RIC) engine driven generating sets	EN 60034-22	1997
IEC 60417 database	-	Graphical symbols for use on equipment	-	-
IEC 60529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529 + corr. May	1991 1993
IEC 61000	Series	Electromagnetic compatibility (EMC)	EN 61000	Series
ISO 3046-1	2002	Reciprocating internal combustion engines - Performance Part 1: Declarations of power, fuel and lubricating oil consumptions, and test methods - Additional requirements for engines for general use	-	-
ISO 7000	- ²⁾	Graphical symbols for use on equipment - Index and synopsis	-	-
ISO 8178-1	- ²⁾	Reciprocating internal combustion engines - Exhaust emission measurement Part 1: Test-bed measurement of gaseous and particulate exhaust emissions	EN ISO 8178-1	1996 ³⁾
ISO 8528-1	- ²⁾	Reciprocating internal combustion engine driven alternating current generating sets Part 1: Application, ratings and performance	-	-
ISO 8528-6	- ²⁾	Part 6: Test methods	-	-

¹⁾ To be published.

²⁾ Undated reference.

³⁾ Valid edition at date of issue.

EN 88528-11:2004

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<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO 8528-9	- ²⁾	Part 9: Measurement and evaluation of mechanical vibrations	-	-
ISO 8528-10	- ²⁾	Part 10: Measurement of airborne noise by the enveloping surface method	-	-

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INTERNATIONAL STANDARD

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Part 11: Rotary uninterruptible power systems – Performance requirements and test methods

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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**RECIPROCATING INTERNAL COMBUSTION ENGINE DRIVEN
ALTERNATING CURRENT GENERATING SETS –**
**Part 11: Rotary uninterruptible power systems –
Performance requirements and test methods**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 88528-11 has been prepared jointly by IEC technical committee 2: Rotating machinery, and ISO technical committee 70: Internal combustion engines.

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

FDIS	Report on voting
2/1275/FDIS	2/1280/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.

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

The committee has decided that the contents of this publication will remain unchanged until 2007. At this date, the publication will be

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

IEC 88528-11 is integrated into the ISO 8528 series listed below, under the general title *Reciprocating internal combustion engine driven alternating current generating sets*:

Part 1: Application, ratings and performance

Part 2: Engines

Part 3: Alternating current generators for generating sets

Part 4: Controlgear and switchgear

Part 5: Generating sets

Part 6: Test methods

Part 7: Technical declarations for specification and design

Part 8: Requirements and tests for low-power generating sets (available in English only)

Part 9: Measurement and evaluation of mechanical vibrations (available in English only)

Part 10: Measurement of airborne noise by the enveloping surface method

Part 12: Emergency power supply to safety services

[SIST EN 88528-11:2004](https://standards.iteh.ai/catalog/standards/sist/dc4fec7e-881a-46c2-bba5-b44b93ab3d8a/sist-en-88528-11-2004)

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RECIPROCATING INTERNAL COMBUSTION ENGINE DRIVEN ALTERNATING CURRENT GENERATING SETS –

Part 11: Rotary uninterruptible power systems – Performance requirements and test methods

1 Scope

This International Standard, which forms part of the ISO 8528 series, specifies criteria, including performance and test methods, for rotary uninterruptible power systems (UPS) arising out of a combination of mechanical and electrical rotating machines. This standard applies to power supplies primarily designed for supplying uninterrupted a.c. power to the consumer. When operated without input mains feed, the power is provided by stored energy and/or reciprocating internal combustion (RIC) engine and the output power is provided by one or more rotating electrical machines.

This part 11 applies to a.c. power supplies primarily designed for supplying uninterruptible electrical power for stationary land and marine use, excluding supplies for aircraft, land vehicles or locomotives. It also excludes power supplies where the output power is generated by static converters. (See IEC 62040-3.)

The use of a rotary UPS installation to improve the quality of a.c. power supply, to provide voltage and/or frequency conversion, and to provide peak shaving is also described.

For some specific applications (for example, essential hospital supplies, offshore, non-stationary applications, high rise buildings, nuclear, etc.) supplementary requirements may be necessary. The provisions of this part of ISO 8528 should be used as a basis.

2 Normative references

The following referenced documents are indispensable for the application 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 60034-1:2003, *Rotating Electrical Machines – Part 1: Rating and performance*

IEC 60034-22:1996, *Rotating Electrical Machines – Part 22: AC generators for reciprocating internal combustion (RIC) engine driven generating sets*

IEC 60417 (all parts), *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets*

IEC 60529:1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 61000, *Electromagnetic compatibility (EMC)*

ISO 3046-1:2003, *Reciprocating internal combustion engines*

ISO 7000, *Graphical symbols for use on equipment*

ISO 8178-1, *Reciprocating internal combustion engines – Exhaust emission measurement – Part 1: Test-bed measurement of gaseous and particulate exhaust emissions*

ISO 8528-1, *Reciprocating internal combustion engine driven alternating current generating sets – Part 1: Application, ratings and performance*

ISO 8528-6, *Reciprocating internal combustion engine driven alternating current generating sets – Part 6: Test methods*

ISO 8528-9, *Reciprocating internal combustion engine driven alternating current generating sets – Part 9: Measurement and evaluation of mechanical vibrations*

ISO 8528-10, *Reciprocating internal combustion engine driven alternating current generating sets – Part 10: Measurement of airborne noise by the enveloping surface method*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 General

3.1.1

generating set

one or more RIC engines to produce mechanical energy and one or more generators to convert the mechanical energy into electrical energy together with components for transmitting the mechanical energy (for example, couplings, gearbox) and where applicable bearing and mounting components

3.1.2

uninterruptible power system (UPS)

power system for maintaining continuity of load power in the event of failure of the mains power

3.1.3

rotary UPS

UPS where one or more electrical rotating machines provide the output voltage

3.1.4

converter

set of equipment, static or rotating, to convert one type of electric current to another type, different in nature, voltage and/or frequency

3.1.5

power system reactor

regulated or non-regulated inductance in series with the input of some types of UPS

3.1.6

machine set

any combination of one or more electrical rotating machines

3.1.7

energy storage device

device to provide stored energy on failure of the normal power supply system. This energy shall be available either during the total failure time or until the take over of a power supply by the RIC engine

3.1.8

continuity of load power

availability of the power supplied to the load with voltage and frequency within steady-state and transient tolerance bands and with distortion and power interruptions within the limits specified for the load

3.2 Performance of systems and components

3.2.1

mains power

power normally continuously available which is supplied from the electrical power system or by independent electrical power generation

3.2.2

backfeed

condition where a portion of the voltage or energy available within the UPS is fed back to any of the input terminals, either directly or by a leakage path

3.2.3

linear load

load where the parameter Z (load impedance) is a constant when a variable sinusoidal voltage is applied to it and that a sinusoidal voltage causes a sinusoidal current

3.2.4

non-linear load

load where the parameter Z (load impedance) is no longer a constant but is a variable dependent on other parameters, such as voltage or time

3.2.5

power failure

any variation in the input voltage or frequency of the mains power not within acceptable limits

3.2.6

redundant operation

any operation with the addition of parallel functional units or groups of functional units in a system to enhance the availability of load power

3.2.7

power conditioning mode

stable mode of operation that the UPS finally attains when operating under the following conditions:

- normal power is present and within its given tolerance;
- full (100 %) stored energy available within its given restored energy time;
- the operation is or may be continuous;
- the load is within its given range;
- the output voltage is within its given tolerance.

Where a bypass is used:

- the input voltage is available and within specified tolerances;
- the phase lock is active, if present.

3.2.8

independent mode

operation of the UPS when operating under the following conditions:

- normal power is disconnected or is out of given tolerance;
- energy is from storage device or RIC engine;
- load is within the given range;
- output voltage and frequency are within given tolerances.