
Agregati za proizvodnjo izmeničnega toka, gnani z batnim motorjem z notranjim zgorevanjem - 12. del: Zasilna preskrba z električno energijo za varnostne naprave

Reciprocating internal combustion engine driven alternating current generating sets -
Part 12: Emergency power supply to safety services

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Groupes électrogènes à courant alternatif entraînés par moteurs alternatifs à combustion interne - Partie 12: Alimentation électrique de secours de services de sécurité

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Part 12: Emergency power supply to safety services

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 70, *Internal combustion engines*.

This second edition cancels and replaces the first edition (ISO 8528-12:1997), of which it constitutes a minor revision. The changes are as follows:

- structure updated according to the current ISO template;
- normative references updated;
- previous Clause 4 deleted – the symbols used in ISO 8528-5 now apply;
- [Clause 7](#) split into subclauses;
- hanging paragraphs removed from [Clauses 8](#) and [9](#);
- values in [Table 3](#) modified based on the values in ISO 8528-5:2022, Table 4;
- minor editorial changes.

A list of all parts in the ISO 8528 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Reciprocating internal combustion engine driven alternating current generating sets —

Part 12: Emergency power supply to safety services

1 Scope

This document applies to generating sets driven by reciprocating internal combustion (RIC) engines for emergency power supply to safety services.

This document applies, for example, to safety equipment in hospitals, high-rise buildings and public gathering places. It establishes the special requirements for the performance, design and maintenance of generating sets used in these applications referred to previously and takes into account the provisions of ISO 8528-1 to ISO 8528-6 and ISO 8528-10¹⁾.

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.

ISO 8528-1:2018, *Reciprocating internal combustion engine driven alternating current generating sets — Part 1: Application, ratings and performance* ISO 8528-12:2023

ISO 8528-2:2018, *Reciprocating internal combustion engine driven alternating current generating sets — Part 2: Engines* <https://standards.iteh.ai/catalog/standards/sist/d10a8714-1176-42fc-be19-40891c997198/sist-iso-8528-12-2023>

ISO 8528-3, *Reciprocating internal combustion engine driven alternating current generating sets — Part 3: Alternating current generators for generating sets*

ISO 8528-4:2005, *Reciprocating internal combustion engine driven alternating current generating sets — Part 4: Controlgear and switchgear*

ISO 8528-5:2022, *Reciprocating internal combustion engine driven alternating current generating sets — Part 5: Generating sets*

ISO 8528-6:2005, *Reciprocating internal combustion engine driven alternating current generating sets — Part 6: Test methods*

IEC 60364-7-710, *Low-voltage electrical installations — Part 7-710: Requirements for special installations and locations — Medical locations*

IEC 60622, *Secondary cells and batteries containing alkaline or other non-acid electrolytes — Sealed nickel-cadmium prismatic rechargeable single cells*

IEC 60623, *Secondary cells and batteries containing alkaline or other non-acid electrolytes — Vented nickel-cadmium prismatic rechargeable single cells*

IEC 60896-11, *Stationary lead-acid batteries — Part 11: Vented types — General requirements and methods of tests*

IEC 60896-21, *Stationary lead-acid batteries — Part 21: Valve regulated types — Methods of test*

1) Under preparation. Stage at the time of publication: ISO/FDIS 8528-10:2022.

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IEC 61951-1, *Secondary cells and batteries containing alkaline or other non-acid electrolytes — Secondary sealed cells and batteries for portable applications — Part 1: Nickel-Cadmium*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8528-1 to ISO 8528-6 and the following apply.

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

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

3.1 changeover time

time interval from the appearance of a malfunction of the normal electrical power supply system until the safety services are again connected to the emergency power supply

Note 1 to entry: This connection to the safety services may be applied in several load steps.

3.2 bridging time

minimum time for which the generating station supplies the consumers with electrical power under predetermined operating conditions

Note 1 to entry: The bridging time corresponds with the rated operating time as defined in IEC 60601-1.

3.3 safety services

equipment for the safety of persons which is installed and kept prepared in case of failure of the usual electrical power supply system

3.4 consumer power demand

total of all intended demands of the connected consumers, taking into consideration the actual load steps

3.5 power demand for safety services

required power demand to fulfil the safety service requirements

4 Additional regulations and requirements

If special requirements or additional regulations are to be observed, they shall be stated by the customer and agreed upon between manufacturer and customer.

5 Classification designation

5.1 General

Classification of generating sets for safety services is based on performance class G2 as defined in ISO 8528-1 and the required changeover time, t_{co} , according to IEC 60364-5-56 and [Table 1](#).

Table 1 — Classification by changeover time

Generating sets	No break	Short break	Long break	
Changeover time	0	< 0,5 s	< 15 s	> 15 s
Classification	1	2	3	4

5.2 Typical examples of classification

Typical examples of classification as defined in [Table 1](#) are given in [Table 2](#).

Table 2 — Examples

Classification	Typical examples
1	The mains voltage drops below the rated voltage by more than 10 %. After a changeover time of 0 s the power for the consumer power demand for safety services shall be available. The design of the no-break generating sets depends on the required frequency and voltage deviations.
2	The mains voltage drops below the rated voltage by more than 10 %. After a changeover time of 0,5 s the power for the consumer power demand for safety services shall be available. The design of the short-break generation set depends on the required frequency and voltage deviations.
3	The mains voltage drops below the rated voltage by more than 10 % for a period longer than 0,5 s. After a changeover time of maximum 15 s, power for 100 % of the consumer power demand for safety services shall be available in steps.
4	The mains voltage drops below the rated voltage by more than 10 % for a period longer than 0,5 s. After a changeover time of maximum 15 s, power for 80 % of the consumer power demand for safety services shall be available in two steps, and the power for 100 % of the consumer demand shall be available after an additional 5 s has passed.

6 Generating set design

6.1 Criteria for determining the required power

To ensure a reliable supply of electrical power by the generating set, the generating set manufacturer shall be informed of the power requirements of the installations to be supplied.

The power requirements shall include short load peaks when switching in electrical installations (e.g. lifts, pumps, fans, lighting equipment and nonlinear electrical installations). Where applicable, for example for reasons of redundancy, the use of several generating sets operating in parallel will possibly be required.

Since many modern RIC engines are turbocharged, it will be necessary to arrange load acceptance in several steps.

For load acceptance, the definitions and values laid down in ISO 8528-5:2022, 8.4, Figure 5 and Figure 6 apply, where the load acceptance capability of the generating set is shown to be dependent on the brake mean effective pressure of the RIC engine.

If larger steps are used than those recommended in ISO 8528-5:2022, Figure 5 and Figure 6, either suitable additional measures shall be taken or the generating set power rating and, where applicable, the rotating mass of the flywheel shall be increased.

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The information provided by the checklist in [Clause 13](#) is recommended for designing the generating set.

Essential equipment of emergency generating sets, such as a cooling system, a fuel system including storage tank and a lubrication system, shall be provided to ensure the operation of the generating set for the required period.

The cooling system of the RIC engine shall be self-contained.

6.2 Power determination

ISO 8528-1:2018, Clauses 13 and 14 apply for determining the power requirement.

6.3 Operating limit values

The operating limits shall at least meet the requirements of performance class G2 in ISO 8528-5:2022.

Special requirements for the limit values are given in ISO 8528-5:2022, Table 4.

The transient operating limits given in ISO 8528-5:2022, Table 4 generally apply.

Classifications given in [Table 2](#) are listed in [Table 3](#).

Table 3 — Special requirements for examples given in [Table 2](#)

Parameter	Symbol	Unit	Reference	Classification			
				1	2	3	4
Frequency droop	δf_{st}	%	ISO 8528-5:2022, 3.1.26	AMC ^a	AMC	≤ 5	≤ 4
Steady-state frequency band	β_f	%	ISO 8528-5:2022, 3.1.23	AMC	AMC	$\leq 1,5$	$\leq 0,5$
Transient frequency deviation from rated frequency	δf_{dyn}^-	%	ISO 8528-5:2022, 3.2	AMC	AMC	-10	-10
Steady-state voltage deviation	ΔU_{st}	%	ISO 8528-5:2022, 3.1.28	AMC	AMC	$\leq \pm 2,5$	$\leq \pm 1$
Transient voltage deviation	ΔU_{dyn}^+	%	ISO 8528-5:2022, 3.2	AMC	AMC	+20	+10
	ΔU_{dyn}^-	%				-15	-10
Voltage recovery time	$t_{u,de}$	s	ISO 8528-5:2022, 3.2	AMC	AMC	4	4
	$t_{u,in}$	s	ISO 8528-5:2022, 3.2				
Unbalanced load current ratio	I_2 / I_N^b	1	IEC 60034-1:2017, 7.2.3	33 ^c 15 ^d	33 ^c 15 ^d	33 ^c 15 ^{b,d}	33 ^c 15 ^d

NOTE All other values are given in ISO 8528-5.

^a AMC agreement between AC generating set manufacturer and customer.

^b See also definition in IEC 60034-1:2017, 7.2.3.

^c For generating sets with ratings above 300 kVA.

^d For generating sets with ratings below 300 kVA.

^e This applies also to the voltage between conductors and the neutral conductor under linear and symmetrical loading.