SLOVENSKI STANDARD
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Agregati za proizvodnjo izmeničnega toka, gnani z batnim motorjem z notranjim zgorevanjem - 8. del: Zahteve in preskusi za agregate majhnih moči

Reciprocating internal combustion engine driven alternating current generating sets -- Part 8: Requirements and tests for low-power generating sets

Groupes électrogènes à courant alternatif entraînés par moteurs alternatifs à combustion interne -- Partie 8: Prescriptions et essais pour groupes électrogènes de faible puissance

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27.020	Motorji z notranjim zgorevanjem	Internal combustion engines
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INTERNATIONAL STANDARD

ISO 8528-8

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Reciprocating internal combustion engine driven alternating current generating sets —

Part 8:

Requirements and tests for low-power generating sets

Groupes électrogènes à courant alternatif entraînés par moteurs alternatifs à combustion interne —

Partie 8: Prescriptions et essais pour groupes électrogènes de faible puissance

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Contents

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 8528-8 was prepared by Technical Committee ISO/TC 70, *Internal combustion engines*, Subcommittee SC 2, *Performance and tests*.

ISO 8528 consists of the following parts, 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*
- — *Part 9: Measurement and evaluation of mechanical vibrations*
- — *Part 10: Measurement of airborne noise by the enveloping surface method*
- — *Part 11: Dynamic uninterruptible power supply systems*
- — *Part 12: Emergency power supply to safety services*

Annex A of this part of ISO 8528 is for information only.

Reciprocating internal combustion engine driven alternating current generating sets —

Part 8:
Requirements and tests for low-power generating sets

1 Scope

This part of ISO 8528 defines requirements, minimum performances and type tests for low-power generating sets driven by reciprocating internal combustion engines for land and marine use (domestic, recreational and industrial application), excluding generating sets used on aircraft.

It concerns mainly low-power generating sets driven by reciprocating internal combustion engines for the generation of single or multiphase alternating current or direct current up to 500 V. The generating sets are standard manufactured sets that can be selected from a commercial catalogue or leaflet.

In this part of ISO 8528, "low power" is taken to mean power of a magnitude up to approximately 10 kW.

NOTE 1 An exact determination of a power limit is not possible.

Low-power generating sets for the purpose of this standard are determined by the following special features:

— the users normally are laymen (for further details see 3.1);

— the complete generating set is usually transportable, or mobile;

— the electrical output is connected by plugs and sockets (except for extra low voltages; see 6.6.3);

— the generating set is ready for use without any additional installation work by the user.

Generating sets for special applications or of higher rated power conforming to the above special features may, by agreement between manufacturer and customer, be tested in accordance with this part of ISO 8528. If supplementary stipulations are required for certain applications this should be done taking this part of ISO 8528 as a basis.

This part of ISO 8528 deals with the special requirements of test and safety design which should be observed in addition to the definitions and requirements laid down in ISO 8528 parts 1 to 6, where applicable.

Furthermore it lays down safety requirements in order to protect the user from danger.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8528. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 8528 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3046-1:1995, *Reciprocating internal combustion engines — Performance — Part 1: Standard reference conditions, declarations of power, fuel and lubricating oil consumptions, and test methods.*

ISO 8528-1:1993, *Reciprocating internal combustion engine driven alternating current generating sets — Part 1: Application, ratings and performance.*

ISO 8528-2:1993, *Reciprocating internal combustion engine driven alternating current generating sets — Part 2: Engines.*

ISO 8528-3:1993, *Reciprocating internal combustion engine driven alternating current generating sets — Part 3: Alternating current generators for generating sets.*

ISO 8528-4:1993, *Reciprocating internal combustion engine driven alternating current generating sets — Part 4: Controlgear and switchgear.*

ISO 8528-5:1993, *Reciprocating internal combustion engine driven alternating current generating sets — Part 5: Generating sets.*

ISO 8528-6:1993, *Reciprocating internal combustion engine driven alternating current generating sets — Part 6: Test methods.*

ISO 7000:1989, *Graphical symbols for use on equipment — Index and synopsis.*

IEC 34-1:1994, *Rotating electrical machines — Part 1: Rating and performance.*

IEC 34-5:1991, *Rotating electrical machines — Part 5: Classification of degrees of protection provided by enclosures for rotating electrical machines.*

IEC 68-2-63:1991, *Environmental testing — Part 2: Tests — Test Eg.: Impact, spring hammer.*

IEC 83:1975, *Plugs and socket-outlets for domestic and similar general use — Standards.*

IEC 245-4:1980, *Rubber insulated cables of rated voltages up to and including 450/750 V — Part 4: Cords and flexible cables.*

IEC 309-1:1988, *Plugs, socket-outlets and couplers for industrial purposes — Part 1: General requirements.*

IEC 309-2:1989, *Plugs, socket-outlets and couplers for industrial purposes — Part 2: Dimensional interchangeability requirements for pin and contact-tube accessories.*

IEC 335-1:1991, *Safety of household and similar electrical appliances — Part 1: General requirements.*

IEC 364-4-41:1992, *Electrical installations of buildings — Part 4: Protection for safety — Chapter 41: Protection against electric shock.*

IEC 417:1973, *Graphic symbols for use on equipment — Index, survey and compilation of the single sheets.*

IEC 529:1989, *Degrees of protection provided by enclosures (IP Code).*

CISPR 12:1990, *Limits and methods of measurement of radio interference characteristics of vehicles, motor boats, and spark ignited engine-driven devices.*

CISPR 14:1993, *Limits and methods of measurement of radio disturbance characteristics of electrical motor-operated and thermal appliances for household and similar purposes, electric tools and electric apparatus.*

3 Definitions

For the purposes of this part of ISO 8528 the following definitions and those of ISO 8528-1 shall apply.

3.1 layman: A person who does not necessarily recognize potential danger resulting from electricity, moving parts or hot parts (see also clause 6). The layman has a lack of training, knowledge and experience, and has insufficient knowledge of the relevant regulations.

3.2 close proximity: The 30 mm space immediately around the operating and adjusting controls and carrying handles, including their whole movement range.

3.3 power rating: The electric power available at the outlets or sockets of the generator, expressed in kilowatts (kW) at the rated frequency and the rated power factor.

3.4 rated power: The prime power according to ISO 8528-1:1993, 13.3.2 as assigned by the generating set manufacturer.

NOTE 2 Due to the variable power sequence for this kind of low-power generating set the average permissible power is 90 % of the rated power.

3.5 thermal steady-state condition: State reached when the temperature rise of the generator does not vary by more than 2 K over a period of 1 h. For electrical parts see IEC 34-1:1994, 2.11; for RIC engines see ISO 3046-3, 4.2.

NOTE 3 Under normal test conditions the RIC engine has first reached a steady-state condition before a set of

measurements is taken. If not, the permissible deviations for the steady-state conditions of the RIC engine according to ISO 3046-3 apply.

3.6 uncontrolled generator: Where there is no load- and speed-dependent adjustment of excitation by an automatic voltage regulator for control of terminal voltage.

NOTE 4 This includes generators with directly acting load current-dependent excitation devices (compounding).

3.7 automatic voltage regulator-controlled generator: Where the terminal voltage is controlled by changing the excitation by means of an automatic voltage regulator as a function of load and speed.

4 Regulations and additional requirements

For low-power generating sets additional regulations depending on the location of its operation may exist.

These may refer to environmental and safety requirements defined in the laws and regulations of the legal authorities in the different countries where generating sets are used. They are mainly in the fields of

— noise emission limitation;

— exhaust gas emission limitation;

— electrical safety;

— fuel systems.

5 General notes on tests

Tests according to this part of ISO 8528 are type tests; unless otherwise specified, the tests are made on a single sample as delivered, which shall withstand all the relevant tests.

During the tests the temperature of the ambient air shall be kept between 15 °C and 30 °C.

Generating sets built for more than one type of rated voltage, rated frequency or current shall be tested for all relevant operating parameters.

6 Safety requirements and tests

The requirements and tests cover mechanical and electrical performance and safety.

Acceptability of the component parts of the generating set shall be judged on the mechanical and electrical strength and resistance to ignition and distorsion.

6.1 Mechanical strength

6.1.1 Generating sets shall be designed in such a way as to be able to withstand robust handling within the framework of normal operation. All parts, damage to which may impair safety, shall have sufficient mechanical strength.

The generating set shall satisfy the tests defined below.

a) Subjected to impact using an impact tester

Blows are applied to the generating set by means of the spring-operated impact tester according to IEC 68-2-63.

The spring is adjusted in such a way as to cause the hammer to strike with an impact energy of 1,0 J ± 0,05 J.

The release mechanism springs are adjusted in such a way as to exert just sufficient pressure to keep the release jaws in the engaged position.

The apparatus is cocked by pulling the cocking knob until the release jaws engage with the groove in the hammer shaft.

Blows are applied by pushing the release cone against the sample in a direction perpendicular to the surface of the sample at the point to be tested.

Pressure is slowly increased so that the cone moves back until it is in contact with the release bars, which then move to operate the release mechanism and allow the hammer to strike.

The entire sample, under no-running conditions, is rigidly held and three blows are applied to every point of the enclosure which is likely to be weak.

Blows are also applied to protective devices, handles, levers, knobs, etc.

b) Free-fall test

Before testing the generating set shall be in the ususal carrying/transporting position. It is dropped from a height of 20 cm on to a concrete floor. This test is performed once.

After testing, the sample shall exhibit no damage which would impair mechanical or electric safety.