

# SLOVENSKI STANDARD

## SIST ISO 8528-1:2002

01-december-2002

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**Agregati za proizvodnjo izmeničnega toka, gnani z batnim motorjem z notranjim zgorevanjem - 1. del: Uporaba, značilnosti in zahteve**

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

### iTeh STANDARD PREVIEW

Groupes électrogènes à courant alternatif entraînés par moteurs alternatifs à combustion interne -- Partie 1: Application, caractéristiques et performances

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Ta slovenski standard je istoveten z: **ISO 8528-1:1993**

#### **ICS:**

27.020	Motorji z notranjim zgorevanjem	Internal combustion engines
29.160.40	Električni agregati	Generating sets

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**en**

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# INTERNATIONAL STANDARD

**ISO**  
**8528-1**

First edition  
1993-04-15

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## Reciprocating internal combustion engine driven alternating current generating sets —

### Part 1: Application, ratings and performance (standards.iteh.ai)

*Groupes électrogènes à courant alternatif entraînés par moteurs  
alternatifs à combustion interne —*  
*Partie 1: Application, caractéristiques et performances*



Reference number  
ISO 8528-1:1993(E)

## 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 8528-1 was prepared by Technical Committee ISO/TC 70, *Internal combustion engines*, Sub-Committee 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: *Low-power general-purpose generating sets*
- Part 9: *Measurement and evaluation of mechanical vibration*

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- *Part 10: Measurement of airborne noise — Enveloping surface method*
- *Part 11: Security generating sets with uninterruptible power systems*

Parts 7, 8, 9 and 10 are in course of preparation. Part 11 is at an early stage of preparation and may be split into two parts.

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# Reciprocating internal combustion engine driven alternating current generating sets —

## Part 1:

### Application, ratings and performance

#### 1 Scope

This part of ISO 8528 defines various classifications for the applications, ratings and performance which arise out of the combination of generating sets consisting of a reciprocating internal combustion (RIC) engine, alternating current (a.c.) generator, control-gear, switchgear and auxiliary equipment.

It applies to a.c. generating sets driven by RIC engines for land and marine use, excluding generating sets used on aircraft or to propel land vehicles and locomotives.

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

For other reciprocating-type prime movers (e.g. sewage-gas engines, steam engines), the provisions of this part of ISO 8528 should be used as a basis.

The generating sets according to this International Standard are used to generate electrical power for continuous, peak-load and standby supplies. The classifications laid down in this part of ISO 8528 are intended to help understanding between manufacturer and customer.

#### 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 edi-

tions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3046-1:1986, *Reciprocating internal combustion engines — Performance — Part 1: Standard reference conditions and declarations of power, fuel consumption and lubricating oil consumption.*

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.*

IEC 34-1:1983, *Rotating electrical machines — Part 1: Rating and performance.*

IEC 298:1990, *A.C. metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV.*

IEC 439-1:1985, *Low-voltage switchgear and controlgear assemblies — Part 1: Requirements for type-tested and partially type-tested assemblies.*

IEC 439-2:1987, *Low-voltage switchgear and controlgear assemblies — Part 2: Particular requirements for busbar trunking systems (busways).*

## ISO 8528-1:1993(E)

**3 Symbols and abbreviations**

$P$	Power, in kilowatts
$p_r$	Total barometric pressure, in kilopascals
$T_{cr}$	Charge air coolant temperature, in kelvins
$T_r$	Air temperature, in kelvins
$t$	Time, in seconds
$\phi_r$	Relative humidity, as a percentage
a.c.	Alternating current
COP	Continuous power
LTP	Limited-time running power
PRP	Prime power

**4 Other regulations and additional requirements**

**4.1** For a.c. generating sets used on board ships and offshore installations which have to comply with rules of a classification society, the additional requirements of the classification society shall be observed. The classification society shall be stated by the customer prior to placing of the order.

For a.c. generating sets operating in non-classed equipment, such additional requirements are in each case subject to agreement between the manufacturer and customer.

**4.2** If special requirements from regulations of any other authority (e.g. inspecting and/or legislative authorities) have to be met, the authority shall be stated by the customer prior to placing of the order.

Any further additional requirements shall be subject to agreement between the manufacturer and customer.

**5 General description****5.1 Generating set**

A generating set consists of 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.

**5.1.1 Prime movers**

These may be of two types:

- compression-ignition engines, and
- spark-ignition engines.

Depending on the application of the generating set, the following criteria, among others, may be important for the selection of the prime mover to be used:

- quality of fuel and fuel consumption;
- exhaust gas and noise emission;
- speed range;
- mass and dimensions;
- sudden loading and frequency behaviour;
- short-circuit characteristics of the generator;
- cooling systems;
- starting systems;
- maintenance;
- waste heat utilization.

**5.1.2 Generators**

These may be of two types:

- synchronous generators, and
- asynchronous generators.

Depending on the application of the generating set, the following criteria, among others, may be important for the selection of the generator to be used:

- voltage characteristics during starting, nominal operation and overload operation, as well as after load changes taking into account the power factor;
- short-circuit behaviour (electrical, mechanical);
- efficiency;
- generator design and type of enclosure;
- parallel-operation behaviour;
- maintenance.

**5.1.3 Controlgear and switchgear**

Equipment for control, switching and monitoring is combined into controlgear and switchgear systems, for the operation of the generating set.

**5.1.4 Auxiliaries**

Auxiliaries are items of equipment essential for the operation of the generating set, such as

- starting system;
- air intake and exhaust gas systems;
- cooling system;
- lubricating oil system;
- fuel system (including fuel treatment where applicable);
- auxiliary electrical power supply.



## 5.2 Power station

A power station comprises one or more generating sets and their auxiliary equipment, the associated controlgear and switchgear and, where applicable, the place of installation (e.g. a building, an enclosure or special equipment for protection from the weather).

## 6 Application criteria

### 6.1 Modes of operation

The mode of operation of the generating set may affect certain important characteristics (e.g. its economical and reliable operation, the intervals between maintenance and repair), and shall be taken into account by the customer when agreeing the requirements with the manufacturer (see also clause 11).

#### 6.1.1 Continuous operation

Continuous operation is operation of a generating set without a time limit, but considering the maintenance period.

#### 6.1.2 Limited-time operation

Limited-time operation is operation of the generating set for a limited time.

NOTE 1 The demand for electrical power from the connected equipment is supplied from the mains and only in the event of failure of the latter is it supplied by an internal generating set. If there is a failure in the normal power supply, the internal generating set, operating as a back-up or emergency supply, provides a supply temporarily or for a limited time for

- safety equipment (e.g. during the evacuation of a building);
- connected equipment which is important for the purposes of operation, to maintain emergency operation;
- the entire group of connected equipment or part thereof.

The electrical power generated is used to cover a peak demand (peak-load operation).

There is no mains supply and the generating set is only operated from time to time.

### 6.2 Site criteria

#### 6.2.1 Land use

Land use covers generating sets, either fixed, transportable or mobile, which are used on land.

#### 6.2.2 Marine use

Marine use covers generating sets used on board ships and offshore installations.

### 6.3 Single and parallel operation

Generating sets may have two types of operation, defined in 6.3.1 and 6.3.2.

#### 6.3.1 Single operation

Single operation refers to a generating set, irrespective of its configuration or modes of start-up and control, which will operate as the sole source of electrical power and without the support of other sources of electrical supply.

#### 6.3.2 Parallel operation

Parallel operation refers to the electrical connection of a generating set to another source of electrical supply with the same voltage, frequency and phase to share the power supply for the connected network. The characteristics of the mains supply, including range and variation of voltage, frequency, impedance of the network, etc., shall be stated by the customer.

##### 6.3.2.1 Parallel operation by generating sets

In this type of operation, two or more generating sets are electrically connected (not mechanically connected) after having been brought into synchronism. Generating sets with different outputs and speeds can be used.

##### 6.3.2.2 Operation in parallel with mains

In this type of operation, one or more parallel-operating generating sets (as described in 6.3.2.1) are electricity connected to a mains supply.

#### NOTES

2 In the case of a public mains, permission for parallel operation has to be obtained from the public electricity board. Protective equipment has to be harmonized.

3 This also applies to generating sets which, in order to check the start-up, have to run supplying power into the mains for a time period laid down by the generating set manufacturer.

### 6.4 Modes of start-up and control

The modes of start-up and control involved in the operation of a generating set are normally

- starting,
- monitoring,
- voltage and frequency adjusting and synchronization where applicable,