

Nederlandse norm

NEN-ISO 8528-2

(en)

Generatoreenheden voor wisselstroom
aangedreven door een zuigermotor met
inwendige verbranding - Deel 2: Motoren (ISO
8528-2:2018,IDT)

Reciprocating internal combustion engine driven
alternating current generating sets - Part 2:
Engines (ISO 8528-2:2018,IDT)

Vervangt NEN-ISO 8528-2:2005

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- ISO 8528-2:2018, IDT

Normcommissie 345055 'Verbrandingsmotoren'



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Preview

COPIED FOR

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

**Part 2:
Engines**

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

Partie 2: Moteurs



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CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
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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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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

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

This third edition cancels and replaces the second edition (ISO 8528-2:2005), of which it constitutes a minor revision.

The main changes compared to the previous edition are as follows:

- the normative references have been updated;
- editorial changes have been made.

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

Reciprocating internal combustion engine driven alternating current generating sets —

Part 2: Engines

1 Scope

This document specifies the principal characteristics of Reciprocating Internal Combustion (RIC) engines when used for alternating current (a.c.) generating set applications.

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

For some specific applications (e.g. essential hospital supplies, high rise buildings), supplementary requirements can be necessary. The provisions of this document can be regarded as the basis for establishing any supplementary requirements.

The terms which define the speed governing and speed characteristics of RIC engines are listed and explained where they apply specifically to the use of the engine for driving a.c. generators.

For other reciprocating-type prime movers (e.g. steam engines), the provisions of this document can be used as a basis for establishing these requirements.

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 3046-1, *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 8528-1:2018, *Reciprocating internal combustion engine driven alternating current generating sets — Part 1: Application, ratings and performance*

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

3 Terms, symbols, and definitions

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

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

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

An explanation of the symbols and abbreviations used in this document is shown in [Table 1](#).

Table 1 — Symbols, terms and definitions

| Symbol | Term | Unit | Definition |
|--|--|-------------------|---|
| n | Engine speed | min ⁻¹ | |
| n_r | Declared speed | min ⁻¹ | Engine speed at declared power corresponding to the rated frequency of the generating set. |
| n_{sf} | Firing speed | min ⁻¹ | Engine speed to which an engine must be accelerated from rest by the use of an external supply of energy separate from the fuel feed system before the engine becomes self-sustaining. |
| n_{max} | Maximum permissible speed | min ⁻¹ | Speed of the engine specified by the RIC engine manufacturer which lies a safe amount below the speed limit (see NOTE 1 and Figure 3). |
| n_a | Partial load speed | min ⁻¹ | Steady-state engine speed of an engine running at a % of the declared power given by: $a = 100 \times \frac{P_a}{P_r}$ EXAMPLE: at 45 % power, $a = 45$ (see Figure 2) For $a = 45$ $n_a = n_{i,r} - \frac{P_a}{P_r} (n_{i,r} - n_r)$ $= n_{i,r} - 0,45 (n_{i,r} - n_r)$ Note 1 to entry: Corresponding values of declared speed and partial-load speed are based on an unchanged speed setting. |
| $n_{i,r}$ | Declared no-load speed | min ⁻¹ | Steady-state engine speed without load at the same speed setting as for the declared speed, n_r . |
| $n_{i,min}$ | Lowest adjustable no-load speed | min ⁻¹ | Lowest steady-state engine speed without load obtainable on the governor speed setting device. |
| $n_{i,max}$ | Highest adjustable no-load speed | min ⁻¹ | Highest steady-state engine speed without load obtainable on the governor speed setting device. |
| $n_{d,s}$ | Setting speed of overspeed limiting device | min ⁻¹ | Speed of the engine, the exceeding of which activates the overspeed limiting device (see Figure 3). |
| $n_{d,o}$ | Operating speed of overspeed limiting device | min ⁻¹ | Speed of the engine at which, for a given setting speed, the limiting device starts to operate (see NOTE 2 and Figure 3). |
| NOTE 1 The speed limit is the maximum calculated speed which the engine can sustain without risk of damage. | | | |
| NOTE 2 For a given engine, the operating speed depends on the total inertia of the generating set and the design of the overspeed protection system. | | | |
| NOTE 3 100 kPa = 1 bar. | | | |

Table 1 (continued)

| Symbol | Term | Unit | Definition |
|--------------------------|--------------------------------------|-------------------|---|
| δn_s | Speed setting related range | % | Range of speed setting, expressed as a percentage of the declared speed given by: $\delta n_s = \frac{n_{i,\max} - n_{i,\min}}{n_r} \times 100$ |
| Δn_s | Speed setting range | min ⁻¹ | Range between the highest and lowest adjustable no-load speeds given by: $\Delta n_s = n_{i,\max} - n_{i,\min}$ |
| $\delta n_{s,\text{do}}$ | Speed setting related downward range | % | Downward range of speed setting, expressed as a percentage of the declared speed given by: $\delta n_{s,\text{do}} = \frac{n_{i,r} - n_{i,\min}}{n_r} \times 100$ |
| $\Delta n_{s,\text{do}}$ | Speed setting downward range | min ⁻¹ | Range between the declared no-load speed and the lowest adjustable no-load speed given by: $\Delta n_{s,\text{do}} = n_{i,r} - n_{i,\min}$ |
| $\delta n_{s,\text{up}}$ | Speed setting related upward range | % | Upward range of speed setting, expressed as a percentage of the declared speed given by: $\delta n_{s,\text{up}} = \frac{n_{i,\max} - n_{i,r}}{n_r} \times 100$ |
| $\Delta n_{s,\text{up}}$ | Speed setting upward range | min ⁻¹ | Range between the highest adjustable no-load speed and the declared no-load speed given by: $\Delta n_{s,\text{up}} = n_{i,\max} - n_{i,r}$ |
| v_n | Speed setting rate of change | %·s ⁻¹ | Rate of change of speed setting under remote control, expressed as a percentage of the related range of speed setting per second given by: $v_n = \frac{(n_{i,\max} - n_{i,\min}) / n_r}{t} \times 100$ |
| | Adjustment range | min ⁻¹ | Speed range over which the overspeed limiting device can be adjusted. |
| δn_{st} | Speed droop | % | Difference between the declared no-load speed and the declared speed at declared power, for fixed speed setting (see Figure 1). It is expressed as percentage of the declared speed given by: $\delta n_{\text{st}} = \frac{n_{i,r} - n_r}{n_r} \times 100$ |

NOTE 1 The speed limit is the maximum calculated speed which the engine can sustain without risk of damage.

NOTE 2 For a given engine, the operating speed depends on the total inertia of the generating set and the design of the overspeed protection system.

NOTE 3 100 kPa = 1 bar.

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