
**Reciprocating internal combustion
engines — Performance —**

**Part 6:
Overspeed protection**

*Moteurs alternatifs à combustion interne — Performances —
Partie 6: Protection contre la survitesse*

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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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of 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 www.iso.org/iso/foreword.html.

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

This fourth edition cancels and replaces the third edition (ISO 3046-6:1990), which has been technically revised. The main changes compared to the previous editions are as follows:

- the scope has been changed;
- new terms have been added;
- overspeed limiting mechanical security requirements have been added;
- overspeed limiting electronic control system security requirements have been added.

All parts of the ISO 3046 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 engines — Performance —

Part 6: Overspeed protection

1 Scope

This document specifies general requirements for overspeed limiting devices used for the protection of reciprocating internal combustion (RIC) engines and their driven machinery.

It applies to reciprocating internal combustion engines for land, rail traction and marine use, excluding engines used in road vehicles and aircrafts.

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 3046-4, *Reciprocating internal combustion engines — Performance — Part 4: Speed governing*

ISO 12100, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

IEC 60204-1, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3046-4 and the following 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/>

3.1

overspeed

condition of the engine exceeding the predetermined speed due to the sudden descent of the engine load, the slow response of the speed regulating system or malfunction

3.2

overspeed limiting device

combination of speed sensing, actuating elements and/or an electronic control system which controls the fuel supply, the intake of air, the load and/or the ignition system for the engine when a predetermined speed is exceeded

3.3

setting speed of overspeed limiting device

$n_{d,s}$

speed at which the activation of the *overspeed limiting device* (3.2) is initiated

Note 1 to entry: See [Figure 1](#).

**3.4
overspeed setting ratio**

$\delta_{d,s}$
difference between the setting speed of the *overspeed limiting device* (3.2) and the *declared speed* (3.8) divided by the declared speed

Note 1 to entry: The overspeed setting ratio is expressed as a percentage. It is given by $\delta_{d,s} = \frac{n_{d,s} - n_r}{n_r} \times 100$.

**3.5
operating speed of overspeed limiting device**

$n_{d,o}$
speed at which, for a given setting speed, the *overspeed limiting device* (3.2) starts to operate

Note 1 to entry: For a given engine the operating speed is dependent on the power of the RIC engine, the total inertia of the RIC engine, the driven machinery and the design of the overspeed limiting device, etc.

**3.6
speed limit**

n_{lim}
maximum calculated speed which can be endured by the engine and its driven machinery without risk of damage

**3.7
maximum permissible speed**

n_{max}
maximum speed specified by the engine or assembly (engine and driven machinery) manufacturer which lies a safe amount below the *speed limit* (3.6)

Note 1 to entry: See [Figure 1](#).

**3.8
declared speed**

n_r
engine speed at declared power

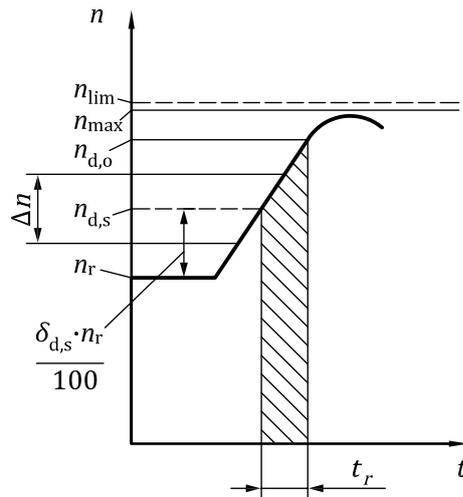
**3.9
adjustment range**

Δn
range within which the *setting speed of overspeed limiting device* (3.3) can be adjusted

**3.10
response time**

t_r
time between reaching and exceeding the *setting speed* (3.3) and reaching the *operating speed* (3.5) of the *overspeed limiting device* (3.2)

Note 1 to entry: See [Figure 1](#).



Key

- t time
 n engine speed

Figure 1 — Typical speed curve illustrating engine overspeed limiting device response

4 General requirements

- 4.1** The overspeed limiting device shall function at all levels of power of the engine.
- 4.2** The mechanical safety of the overspeed limiting device shall comply with the requirements of ISO 12100.
- 4.3** The electronic control system safety of the overspeed limiting device shall comply with the requirements of IEC 60204-1.
- 4.4** The use of an overspeed limiting device, and any special requirements for it (see 6.1, NOTE 1 and NOTE 2), shall be determined by the application and/or by agreement between the manufacturer and the customer, taking into consideration requirements from inspecting and/or classification societies specified by the customer.
- 4.5** The manufacturer of the assembly (engine and driven machinery) shall be responsible for ensuring that the setting speed of the overspeed limiting device is satisfactory with respect to the maximum permissible speed.
- The setting speed of the overspeed limiting device (see Figure 1) shall be specified according to the overspeed limiting device used and its response time, ensuring that all parts of the engine and its driven machinery are protected from damage due to overspeed.
- 4.6** The engine manufacturer shall specify the method and frequency of checking the function of the overspeed limiting device.

5 Other requirements

5.1 For engines 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 taken into consideration. The classification society shall be stated by the customer prior to placing the order.

For non-classed engines, such additional requirements are in each case subject to agreement between the manufacturer and the customer.

5.2 If there are special requirements from regulations of any other authority, for example, inspecting and/or legislative authorities, the authority shall be stated by the customer prior to placing the order.

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

6 Overspeed protection features

6.1 The overspeed limiting device shall not affect in any way the normal operation of the engine control systems. However, in the rare case of occurring, upon reaching an overspeed condition, the overspeed limiting device shall control the relevant engine control systems to correct the overspeed condition or to stop the engine.

NOTE 1 The manufacturer and the customer can agree on whether a failure of the control system will affect the operation of the overspeed limiting device.

NOTE 2 The manufacturer and the customer can agree on whether damage or a fault in the overspeed limiting device will cause the engine to shut down or indicate activation of the overspeed limiting device by alarm or other means.

6.2 An overspeed shutdown condition shall cause the overspeed limiting device to latch in the shutdown position. Normally, restarting the engine requires a manual reset of the latching mechanism. However, an automatic reset may be permitted in special applications and the electronic control system.