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Reciprocating internal combustion engines — Performance —

Part 6:
Overspeed protection

Moteurs alternatifs à combustion interne — Performances —

Partie 6: Protection contre la survitesse

Reference number
ISO 3046-6:1990(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 3046-6 was prepared by Technical Committee ISO/TC 70, *Internal combustion engines*.

This third edition cancels and replaces the second edition (ISO 3046-6:1982), of which it is a technical revision.

ISO 3046 consists of the following parts, under the general title *Reciprocating internal combustion engines — Performance*:

— *Part 1: Standard reference conditions and declarations of power, fuel consumption and lubricating oil consumption*

— *Part 2: Test methods*

— *Part 3: Test measurements*

— *Part 4: Speed governing*

— *Part 5: Torsional vibrations*

— *Part 6: Overspeed protection*

— *Part 7: Codes for engine power*

Annex A of this part of ISO 3046 is for information only.

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Reciprocating internal combustion engines — Performance —

Part 6:
Overspeed protection

1 Scope

This part of ISO 3046 specifies general requirements and gives definitions for overspeed limiting devices used for the protection of reciprocating internal combustion engines and their driven machinery.

It applies to reciprocating internal combustion engines for land, rail traction and marine use, excluding engines used to propel road construction and earth-moving machines, agricultural and industrial types of tractors, road vehicles and aircraft.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 3046. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 3046 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3046-4:1978, *Reciprocating internal combustion engines — Performance — Part 4: Speed governing.*

3 Other regulations and requirements

3.1 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 observed. 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 customer.

3.2 If special requirements from regulations of any other authority, for example inspecting and/or legislative authorities, have to be met, 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 customer.

4 Definitions

For the purposes of this part of ISO 3046, the following definitions apply. Definitions relating to typical engine speeds are given in ISO 3046-4.

4.1 overspeed limiting device: Combination of speed sensing and actuating elements which control the fuel supply and/or the intake of air and/or the ignition system to the engine when a predetermined speed is exceeded.

4.2 setting speed of overspeed limiting device, n_{ds}: Speed at which the activation of the overspeed limiting device is initiated (see figure 1).

4.3 overspeed setting ratio, δ_{ds}: Difference between the setting speed of the overspeed limiting device and the declared speed divided by the declared speed, expressed as a percentage. It is given by

$$\delta_{ds} = \frac{n_{ds} - n_r}{n_r} \times 100$$

4.4 operating speed of overspeed limiting device, n_{do}: Speed at which, for a given setting speed, the overspeed limiting device starts to operate.

NOTE 1 For a given engine the operating speed is dependent on the total inertia of the RIC engine, the driven

machinery and the design of the overspeed limiting device, etc.

4.5 maximum permissible speed, n_{max}: Maximum speed specified by the engine or set (engine and driven machinery) manufacturer which lies a safe amount below the speed limit (see note 2 and figure 1).

NOTE 2 The speed limit, n_{lim}, is the maximum calculated speed which can be endured by the engine and its driven machinery without risk of damage.

4.6 declared speed, n_r: Engine speed at declared power.

4.7 adjustment range: Range in which the setting speed of overspeed limiting device can be adjusted.

4.8 response time, t_r: Time between reaching and exceeding the setting speed (4.2) and reaching the operating speed (4.4) of the overspeed limiting device.

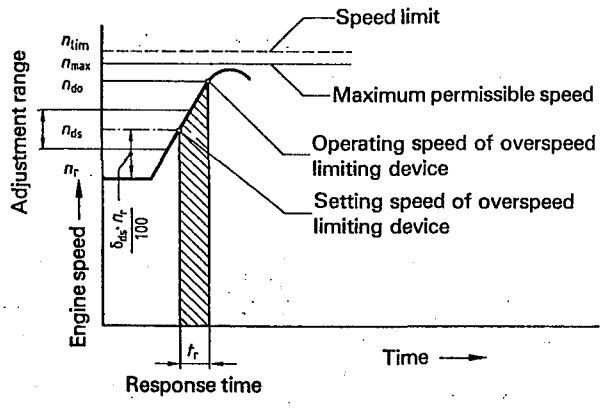

Figure 1 — Typical speed curve illustrating engine overspeed limiting device response

5 General requirements

5.1 Engines and their driven machinery have a speed limit (see figure 1) which cannot be exceeded without the risk of damage.

5.2 The use of an overspeed limiting device, and any special requirements for it (see notes 3 and 4) shall be determined by the application and/or by agreement between the manufacturer and the customer, and/or by inspecting and/or legislative authorities, and/or by classification societies specified by the customer (see also note 1).

5.3 The manufacturer of the set (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 (4.5).

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.

5.4 The overspeed limiting device shall function at all levels of power of the engine.

5.5 The engine manufacturer shall specify the method and frequency of checking the function of the overspeed limiting device.

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, upon reaching an overspeed condition, the overspeed limiting device shall override the relevant engine control systems to correct the overspeed condition or to stop the engine.

NOTES

3 Manufacturer and customer may agree whether a failure of the control system shall or shall not affect the operation of the overspeed limiting device.

4 Manufacturer and customer may agree whether damage or a fault in the overspeed limiting device shall or shall not 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 manual reset of the latching mechanism. However, automatic reset may be permitted in special applications.

Annex A
(informative)

Bibliography

[1] ISO 2710:1978, *Reciprocating internal combustion engines — Vocabulary.*

[2] ISO 8528-2:1992[1], *Reciprocating internal combustion engine driven alternating current generating sets — Part 2: Engines.*

1) To be published.

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