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# Reciprocating internal combustion engines — Vocabulary —

## Part 2: Terms for engine maintenance

*Moteurs alternatifs à combustion interne — Vocabulaire —*

*Partie 2: Termes relatifs à la maintenance du moteur*



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# Foreword

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

This second edition cancels and replaces the first edition (ISO 2710-2:1999), which has been technically revised.

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

— new terms and definitions have been added;

— French and Russian expressions in ISO 2710-2:1999 have been deleted;

— index has been deleted.

A list of all parts in the ISO 2710 series can be found on the ISO website.

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# Reciprocating internal combustion engines — Vocabulary —

# Part 2: Terms for engine maintenance

## 1 Scope

This document defines terms relating to the characteristics of engines and their components relevant to maintenance activities.

This document gives a classification of terms according to reasons for their use and defines typical means, failures and procedures resulting in or from engine maintenance.

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

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

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

### 3.1 Main definitions

**3.1.1**
**failure**
premature malfunction or *breakdown* (3.5.7) of a function, a component or the whole engine

**3.1.1.1**
**critical failure**
*failure* (3.1.1) that may cause personal casualty, engine scrap or breaking the laws or regulations

**3.1.1.2**
**major failure**
*failure* (3.1.1) that causes remarkable degradation of engine performance or *breakdown* (3.5.7) of main components, and cannot be repaired by replacing the *spare part* (3.3.15) with common tools in a short time

Note 1 to entry: The short time is generally 30 min.

**3.1.1.3**
**minor failure**
*failure* (3.1.1) that affects the performance of the engine, but does not cause *breakdown* (3.5.7) of main components, and can be repaired by replacing the part with spare with common tools, usually in a short time

Note 1 to entry: The short time is generally 30 min.

**3.1.1.4**
**mild failure**
*failure* (3.1.1) that does not affect the performance of the engine and can be repaired by replacing the *spare part* (3.3.15) with common tools in 5 min

**3.1.1.5**
**failure cause**
reason or factor that causes *failure* (3.1.1) of the engine or a component

EXAMPLE Design, manufacture, performance and maintenance, etc.

**3.1.1.6**
**failure mechanism**
mechanism that causes the *failure* (3.1.1) of the engine or a component

EXAMPLE Physical, chemical, biological or other processes.

**3.1.1.7**
**failure mode**
manifestation of the engine or a component *failure* (3.1.1)

EXAMPLE Crack, wear and function recession, etc.

**3.1.1.8**
**mean time between failures**
**MTBF**
mean time between two *failures* (3.1.1), which is the predicted elapsed time between inherent failures of the engine during operation

Note 1 to entry: It is expressed in hours (h).

**3.1.1.9**
**mean time to first failure**
**MTTFF**
mean accumulated working time to the first *failure* (3.1.1), which initiates engine shut-down for the first time

Note 1 to entry: It is expressed in hours (h).

**3.1.2**
**inspection**
assessment of the condition of the engine or a component

**3.1.3**
**maintenance**
means or activities designed to assure the service life of the engine

**3.1.3.1**
**repair**
*maintenance* (3.1.3) implemented to restore the engine malfunction to its original state

**3.1.3.2**
**repair time**
time spent on repairing the engine

**3.1.3.3**
**off-site maintenance**
*maintenance* (3.1.3) implemented not on the site where the engine is used

**3.1.3.4**
**on-site maintenance**
*maintenance* (3.1.3) implemented on the site where the engine is used

**3.1.3.5**
**preventive maintenance**
predetermined service or *maintenance* (3.1.3) implemented on the engine in scheduled intervals to reduce the *failure* (3.1.1) probability or prevent function degeneration

**3.1.3.6**
**preventive maintenance time**
time spent on the *preventive maintenance* (3.1.3.5) of the engine

**3.1.4**
**maintainability**
ability of the engine to maintain or restore its original state after the *maintenance* (3.1.3) implemented in accordance with the specified procedure and method, while the engine is used with the specified condition and time

## 3.2 Maintenance procedures

**3.2.1**
**adjusting**
procedure to set a variable control mechanism of the engine to the correct specification

**3.2.2**
**barring**
turning
method of rotating the engine for *inspection* (3.1.2) and *maintenance* (3.1.3) purposes, without firing

**3.2.3**
**debugging**
adjustment and test aimed for restoring the engine to its normal operation condition after *maintenance* (3.1.3)

**3.2.4**
**fault diagnosis**
diagnosis implemented to confirm whether the condition of the engine is normal, and identify where the fault happens and the reason without disassembling the engine

**3.2.5**
**pressure-testing**
leak testing of a component using pressurized air, water or oil

## 3.3 Maintenance means

**3.3.1**
**consumable part**
low-cost part which is renewed as a routine matter

**3.3.2**
**glaze-busting**
treatment given to the running surface of the cylinder liners when the engine is fitted with new piston rings to improve the lubricating oil retention properties

**3.3.3**
**maintenance concept**
specific implementation of engine *maintenance* (3.1.3)

Note 1 to entry: The maintenance concept includes the *maintenance* content, surrounding condition, resources, procedure and quality warranty, etc.

**3.3.4**
**maintenance schedule**
list of *maintenance* (3.1.3) tasks to be performed at predetermined intervals

**3.3.5**
**overhaul**
*maintenance* (3.1.3) activity in which the engine is stripped and the main base components are inspected, replaced or reconditioned and then the engine is reassembled for use

Note 1 to entry: The main base components generally include: crankcase, liner, piston package, crankshaft, main bearing, cylinder head, camshaft, connecting rod and bearing, valve train, drive gear, etc.

**3.3.5.1**
**time to first overhaul**
**TTFO**
first overhaul period
time or mileage from the start of using the engine to its first *overhaul* (3.3.5)

**3.3.5.2**
**time between overhaul**
**TBO**
repair interval
time between two consecutive *overhauls* (3.3.5) of the engine under the required operating condition

**3.3.6**
**medium repair**
*maintenance* (3.1.3) activity in which the main outer components are dissembled for cleaning, *adjusting* (3.2.1), renewing and overhauling, and the engine is not stripped to restore the performance and function of the engine

Note 1 to entry: The main outer components generally include fuel pump, supercharger, water pump, damper, starter, generator, lubricating oil pump, aftertreatment device, etc.

**3.3.7**
**minor repair**
*maintenance* (3.1.3) activity, to restore the performance of the engine, in which only the outer parts are dissembled for cleaning, reconditioning, renewing and *adjusting* (3.2.1) to solve the problems found by daily or regular *inspection* (3.1.2)

**3.3.8**
**recondition**
rework
*overhaul* (3.3.5) of single parts, subassemblies, systems or the whole engine

**3.3.9**
**reconditioned part**
reworked part
single part or subassembly reconditioned (reworked) by mechanical processes

**3.3.10**
**replacement part**
single part or subassembly used to replace a worn or failed part or subassembly

**3.3.11**
**retightening**
tightening of screws, bolts and nuts after a period of running-in, in accordance with the requirements of the engine manufacturer

**3.3.12**
**running-in**
running the engine according to a programmed or suitable schedule after production or major *overhaul* (3.3.5) to improve friction conditions and check for leaks

**3.3.13**
**cold running-in**
running a reconditioned engine by external drive

**3.3.14**
**hot running-in**
running a reconditioned engine by operating on its own

**3.3.15**
**spare part**
single part or subassembly that held in stock as a replacement unit

**3.3.16**
**dressing out**
mechanical means of removing small surface defects

**3.3.17**
**welding up**
welding method and process to repair the failed components

## 3.4 Engine failures

**3.4.1**
**abnormal noise**
noises caused by incorrect valve clearance, ignition timing *adjusting* (3.2.1) or other unknown reasons

EXAMPLE Rat-tat, dang-dang, cha-cha and cough.

**3.4.2**
**abnormal piston blow-by**
excessive passage of combustion gases past the piston rings into the crankcase or the scavenging room

**3.4.3**
**abnormal vibration**
vibration of components, such as high-pressure oil pump, inter cooler and speed controller that can be seen by naked eyes and felt with hands

**3.4.4**
**abnormal wear**
unusual wear that is too quick on the surface of moving parts

**3.4.5**
**belt sag**
deflection of a belt at the centre of the longest run between two belt pulleys under the application of a specified load

**3.4.6**
**cold fuel filter clogging**
cold fuel filter plugging
*blocking* (3.5.6) of fuel passage through a fuel filter due to the formation of wax crystals at low fuel temperature

**3.4.7**
**compressor surge**
*breakdown* (3.5.7) of the regular flow in a turbocharger compressor resulting in a rapid variation of flow rate for a given pressure making a pulsating noise at the turbocharger intake

**3.4.8**
**consequential damage**
damage caused to serviceable parts resulted from the *failure* (3.1.1) of another part

**3.4.9**
**cylinder scuffing**
partial injury of the inner surface of the cylinder by the solid adhesive wear between the cylinder liner and the piston ring or piston

**3.4.10**
**data fault**
abnormal operation of the engine caused by a fault of the electric control data

**3.4.11**
**difficult to start**
<engine> difficult to or cannot be started

**3.4.12**
**exceeding emission**
emission indicator which exceeds the limit of laws and regulations

**3.4.13**
**exhaust plume**
exhaust smoke emission due to unburned fuel (black) or burned lubricating oil (blue)

**3.4.13.1**
**black smoke**
small solid particles formed by unburned fuel, which are mainly caused by the malfunction of the fuel system, combustion system, air intake or exhaust system

**3.4.13.2**
**blue smoke**
blue smoke emission caused by burning of lubricating oil

**3.4.13.3**
**white smoke**
white smoke composed by small liquid particles due to unburned fuel particle or water vapour

**3.4.14**
**exceeding noise**
phenomenon in which the noise indicators exceeds the limit of laws and regulations

**3.4.15**
**galloping**
phenomenon in which the engine is out of control, with speed increased much higher than the rated speed, which causes severe damage

**3.4.16**
**gas leakage**
abnormal running out of gas from the pressured system

**3.4.17**
**hunting**
irregular or uncontrolled engine speed variation, at low frequency (surging) or at high frequency (flutter)

**3.4.18**
**hydraulic lock**
hydrostatic lock
phenomenon in which engine is prevented from *turning* (3.2.2) due to entrapped liquids in the combustion chamber

**3.4.19**
**installation error**
*failure* (3.1.1) due to incorrect/faulty installation

**3.4.20**
**leak-off fuel**
return flow of excess fuel e.g. delivered for cooling purposes

**3.4.21**
**locking**
phenomenon in which components like crankshafts stop rotating in the bearing bush because of poor lubrication or thermal *deformation* (3.5.17)

**3.4.22**
**lug-down**
stall
loading that produces lower engine speeds to a certain point, increases torque and, in extreme cases, can cause the engine to shut down or stall

**3.4.23**
**misfire**
no or incomplete combustion in one or more cylinders causing irregular engine operation

**3.4.24**
**oil leakage**
oil drop or flow spills out from the closed pipe and container

**3.4.25**
**oil seepage**
penetration of oil from the closed pipe or surface of the case but has not fallen

**3.4.26**
**oil-water mixture**
mixture of oil and water in some engine parts like the water tank and oil sump

**3.4.27**
**oil emulsification**
state in which oil loses its function caused by *water leakage* (3.4.37) from the components of the cooling system into the lubrication oil component

**3.4.28**
**oil volatilization**
state in which oil volatilizes due to the *failure* (3.1.1) of the piston rings and the heat penetration of the piston to the walls of the cylinder

**3.4.29**
**overheating**
engine condition when the temperature of the coolant or the engine component is abnormally high

**3.4.30**
**performance degradation**
untimely decline of some engine performance like rated power, torque etc, to the point lower than its regulated dictator

**3.4.31**
**post combustion**
exhaust flames due to malfunctions of the combustion process

**3.4.32**
**power sharp down**
drastic reduction of power of the engine because of inefficient fuel supply

**3.4.33**
**reduction of cooling water**
due to micro cracks or *failure* (3.1.1) of the cooling components or the combustion heat penetration into the cooling path, which reduces the cooling fluid

**3.4.34**
**unbalance**
situation which occurs in rotating parts when the centre of gravity is not identical to the centre of rotation causing excessive vibrations

**3.4.35**
**vapour lock in the fuel system**
partial evaporation of fuel in the carburettor or fuel injection system disrupting the flow of fuel usually resulting from localized *overheating* (3.4.29) or high ambient temperatures

**3.4.36**
**vapour lock due to overheating of fuel in the fuel system**
unstable operation of the engine caused by boiling of fuel in the fuel system due to high ambient temperatures

**3.4.37**
**water leakage**
water drop or flow that spills out from the closed pipe and container

**3.4.38**
**water seepage**
penetration of water from the closed pipe or surface of the case but has not fallen

## 3.5 Component failures

**3.5.1**
**abrasion**
removal of the surface material by scoring/scratching the surfaces with hard foreign particles

**3.5.2**
**ablation**
damage on the components surface caused by partial meltdown

**3.5.3**
**ageing**
*performance degradation* (3.4.30) of non-metal components with time or environmental influence

**3.5.4**
**air-resistor**
*blocking* (3.5.6) of the normal circulation of the liquid by air collected in the pipe

**3.5.5**
**bedding-in pattern**
smooth reflective wear pattern created between two contacting parts during the initial operation

**3.5.6**
**blocking**
*stagnation* (3.5.48) of the liquid in the pipe

**3.5.7**
**breakdown**
electric breakdown
damage caused by sudden increase of the current and electric discharge when the insulator loses its efficiency

**3.5.8**
**burnt**
charred
description of a surface area that is coated with a layer of carbonized combustion products

**3.5.9**
**burning oil**
too much oil gets into the combustion chamber when the piston rings loses its efficiency.

**3.5.10**
**carbon residue**
carbon deposits on parts as a result of incomplete combustion

**3.5.11**
**cavitation corrosion**
erosion
removal of the surface material caused by a liquid experiencing local pressure fluctuations resulting in vapour bubble formation and collapse

**3.5.12**
**chipping**
surface damage due to particles being broken off caused by high local pressures

**3.5.13**
**combustion residue**
solid deposits of combustion products with *carbon residue* (3.5.10)

**3.5.14**
**corrosion**
deterioration of metal by a chemical reaction

**3.5.15**
**crevice corrosion**
damage to metallic surfaces in contact caused by chemical reactions that take place in the crevice

**3.5.16**
**corrosive pitting**
wear consisting of small holes and spots caused by a corrosive mechanism

**3.5.17**
**deformation**
change of components form with the action of an external force

**3.5.18**
**dewpoint corrosion**
*corrosion* (3.5.14) caused by condensed combustion products on areas with low surface temperatures in the combustion chamber or the exhaust duct

**3.5.19**
**electrolytic corrosion**
*corrosion* (3.5.14) caused by the electrolytic reaction of two different metals with interposed liquids

**3.5.20**
**falling off**
components separated because the connecting parts lose its connectivity

**3.5.21**
**fatigue crack**
crack on a component after prolonged repeated loading

**3.5.22**
**fatigue fracture**
fracture of a component due to the extension of a *fatigue crack* (3.5.21)

**3.5.23**
**fretting rust**
*corrosion* (3.5.14) due to the micro movement between two contacting surfaces

**3.5.24**
**frictional fatigue fracture**
fatigue fracture enhanced by friction

**3.5.25**
**glaze**
interference with the correct seating of the ring on the bore or liner wall when deposits caused by combustion gum fill the honed surface grooves

**3.5.26**
**hairline crack**
fine, barely-visible *surface crack* (3.5.10)

**3.5.27**
**heat discoloration**
temper cooling
change of colour of a component due to *overheating* (3.4.29)

**3.5.28**
**high-cycle fatigue**
**HCF**
metal fracture due to high frequency cyclic loading in the elastic region

**3.5.29**
**hot spot**
localized *overheating* (3.4.29) due to the exposure to combustion gas or exhaust gas

**3.5.30**
**indentation**
dent of the surface of the components by pressure

**3.5.31**
**lacquering**
varnishing
thin film of lubricating oil residues polymerized on to the surfaces of a component

EXAMPLE Pistons, valves ,etc.

**3.5.32**
**looseness**
phenomenon that the connecting parts lose its fastening force or fail to coordinate

**3.5.33**
**low-cycle fatigue**
**LCF**
metal fracture due to low frequency cyclic loading in the plastic region

**3.5.34**
**mixed friction**
friction between two components due to the *breakdown* (3.5.7) of the lubricant film causing metal-to-metal contact