
**Reciprocating internal combustion
engines — Vocabulary of components
and systems —**

**Part 11:
Liquid fuel systems**

*Moteurs alternatifs à combustion interne — Vocabulaire des
composants et des systèmes —*

Partie 11:

Systèmes de carburant liquide

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Published in Switzerland

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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).

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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 second edition cancels and replaces the first edition (ISO 7967-11:2014), which has been technically revised.

The main changes are as follows:

- terms and definitions modified and new entries added;
- editorial revisions.

A list of all parts in the ISO 7967 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 — Vocabulary of components and systems —

Part 11: Liquid fuel systems

1 Scope

This document establishes a vocabulary for liquid fuel systems of reciprocating internal combustion engines. The terms and definitions are classified as follows:

- fuel supply system (3.1);
- carburettor (3.2);
- fuel injection system (3.3).

Note ISO 2710-1 gives a classification of reciprocating internal combustion engines and denotes the basic terms and definitions of such engines and their characteristics.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

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

3.1 Fuel supply system

3.1.1

fuel supply system

system which consists of low-pressure fuel equipment for delivering fuel from the fuel tank to the high-pressure unit for fuel injection to the engine

3.1.2

fuel feed pump

low-pressure pump delivering fuel from the tank via one or several filters to the high-pressure-generating components

[SOURCE: ISO 7876-5:2021, 3.2]

3.1.3

fuel filter

fuel strainer

filter to eliminate contamination in the fuel

3.1.4

priming pump

pump to fill the fuel pipe at starting

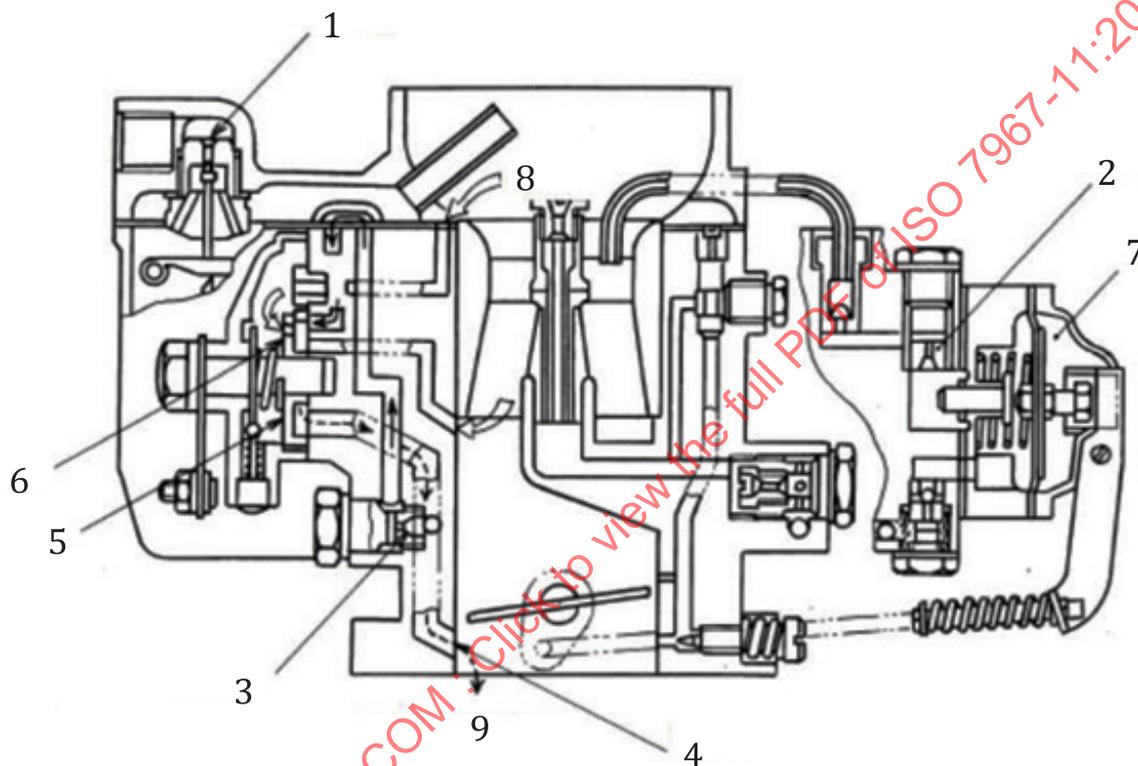
3.2 Carburettor

3.2.1

carburettor

device which vaporizes fuel into charge air and also controls the air-fuel ratio of the mixture

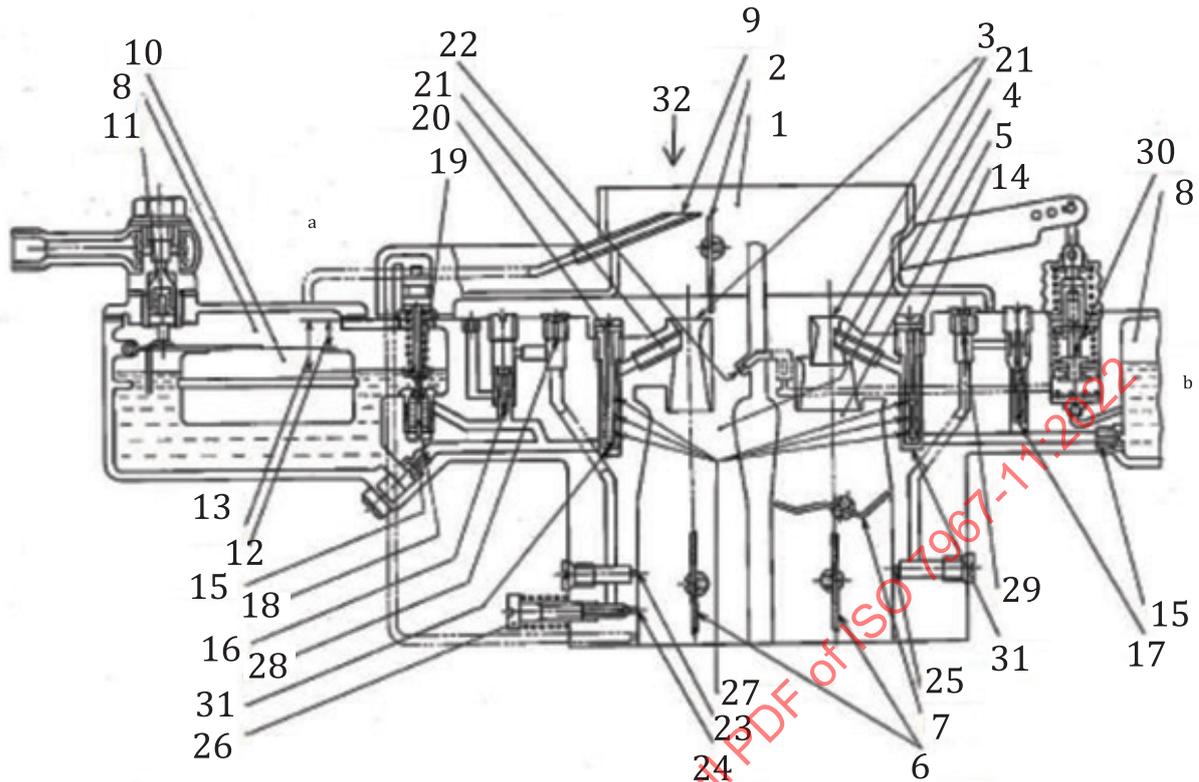
Note 1 to entry: See [Figure 1](#) and [Figure 2](#).



Key

- | | | | |
|---|---|---|--|
| 1 | float valve (3.2.47) | 6 | acceleration pump (3.2.85) |
| 2 | pump jet (3.2.60) | 7 | main well (3.2.86) |
| 3 | starting petrol jet (3.2.61) | 8 | air |
| 4 | starting mixture supply port (3.2.71) | 9 | fuel-air mixture |
| 5 | starting valve (3.2.72) | | |

Figure 1 — Single-barrel carburettor

**Key**

1	air horn (3.2.28)	12	float-level height (3.2.48)	23	progression hole (3.2.68)
2	choke valve (3.2.30)	13	fuel-level height (3.2.49)	24	primary idle orifice (3.2.69)
3	primary venturi (3.2.38)	14	fuel jet (3.2.51)	25	secondary throttle barrel bypass hole (3.2.70)
4	secondary venturi (3.2.39)	15	main jet (3.2.55)	26	idle needle valve (3.2.74)
5	third venturi (3.2.40)	16	slow running jet (3.2.56)	27	idle air bleed (3.2.82)
6	throttle valve (3.2.41)	17	secondary slow jet (3.2.57)	28	step air bleed (3.2.83)
7	air valve (3.2.42)	18	power bypass jet (3.2.58)	29	starting air jet (3.2.84)
8	float chamber (3.2.43)	19	power valve (3.2.59)	30	acceleration pump (3.2.85)
9	float chamber vent (3.2.44)	20	main air bleed (3.2.62)	31	main well (3.2.86)
10	float (3.2.46)	21	main nozzle (3.2.64)	32	air
11	float valve (3.2.47)	22	pump discharge nozzle (3.2.65)		
a	1 st stage.				
b	2 nd stage.				

Figure 2 — Two-barrel carburettor

3.2.2 elementary carburettor

carburettor (3.2.1) without compensation device which consists of the main system, the float unit, the venturi (3.2.33) and the throttle valve (3.2.41)

3.2.3 float carburettor

carburettor (3.2.1) in which the fuel level is maintained at a constant level by the float (3.2.46) and the fuel is absorbed in the air by the vacuum pressure at the venturi (3.2.33)

3.2.4 electronic-controlled carburettor

carburettor (3.2.1) which controls air-fuel ratio by the electronic circuit

3.2.5

air-fuel ratio feedback-controlled carburettor

carburettor (3.2.1) which is equipped with a device for feedback control of air-fuel ratio

3.2.6

fixed-venturi carburettor

carburettor (3.2.1) with a fixed venturi area

3.2.7

variable-venturi carburettor

carburettor (3.2.1) with a mechanism to make the venturi area variable

3.2.8

updraft carburettor

carburettor (3.2.1) with upward exit of air-fuel mixture

3.2.9

downdraft carburettor

carburettor (3.2.1) with downward exit of air-fuel mixture

3.2.10

horizontal carburettor

sidedraft carburettor

carburettor (3.2.1) with horizontal exit of air-fuel mixture

3.2.11

single-barrel carburettor

carburettor (3.2.1) with one set of *venturi* (3.2.33)

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

3.2.12

multi-barrel carburettor

carburettor (3.2.1) with more than two sets of *venturi* (3.2.33)

3.2.13

two-barrel carburettor

carburettor (3.2.1) with two sets of *venturi* (3.2.33)

Note 1 to entry: See [Figure 2](#).

3.2.14

compound carburettor

multiple carburettor

multi-carburettor

carburettor system with more than two sets of independent *carburettors* (3.2.1) in which *throttle valves* (3.2.41) are linked so as to work simultaneously or in sequence

Note 1 to entry: A unit with two carburettors is called a twin carburettor.

3.2.15

two-stage carburettor

carburettor system with two *carburettors* (3.2.1) with different characteristics in which each *throttle valve* (3.2.41) works in sequence

Note 1 to entry: The carburettor which works first is called the primary carburettor and the other is called the secondary carburettor.

3.2.16

float circuit

float system

mechanism which maintains the level of fuel in the *carburettor* (3.2.1)

3.2.17**main metering system**

high-speed system

high-speed circuit

circuit in the *carburettor* (3.2.1) where fuel flows continuously during normal engine operation, except during idling

3.2.18**slow speed system**

idle system

idle circuit

circuit in the *carburettor* (3.2.1) where fuel flows at idling

3.2.19**secondary idle system**

secondary low-speed system

circuit of the secondary *carburettor* (3.2.1) where fuel flows from the main fuel circuit when the opening of the *throttle valve* (3.2.41) is small

3.2.20**power system**

full-power circuit

power enrichment system

circuit where additional fuel flows for the enrichment of air-fuel mixture at high-power operation of the engine

3.2.21**starting system**

choke system

system or a series of parts in the *carburettor* (3.2.1) which restricts the air flow in the *venturi* (3.2.33) at the starting of the engine

3.2.22**accelerating system**

accelerator-pump system

circuit of additional fuel for the enrichment of air-fuel mixture at the sudden acceleration of the engine

3.2.23**compensating device**

device which adjusts air-fuel ratio in accordance with the requirement from the engine using a procedure such as the *air bleed* (3.2.52) method

3.2.24**bore size of throttle-body flange**

throttle-diameter

diameter of the exit of the *carburettor* (3.2.1), which indicates the size of the carburettor

Note 1 to entry: When the carburettor has two or more exits, the size is usually indicated by plural diameters.

3.2.25**carburettor body**

main body of carburettor

body including main parts of the *carburettor* (3.2.1), such as *venturi* (3.2.33) and *float chamber* (3.2.43)

3.2.26**air intake body**

body which forms the *air intake* (3.2.28) passage with the *choke valve* (3.2.30)

3.2.27

flange body

throttle body

body which forms the exit of air passage with the *throttle valve* ([3.2.41](#))

3.2.28

air horn

air intake

air intake portion of the *carburettor* ([3.2.1](#))

3.2.29

choke

mechanism that blocks the air inflow passage to the *carburettor* ([3.2.1](#)) to enrich the air-fuel mixture

3.2.30

choke valve

strangler valve

air shutter

valve for *choking* ([3.2.29](#)) the air inlet in the *carburettor* ([3.2.1](#))

3.2.31

choke relief valve

valve equipped in the *choke valve* ([3.2.30](#)) which relieves charge air when air-fuel ratio exceeds the limit due to excessive negative pressure at the *venturi* ([3.2.33](#))

3.2.32

automatic choke

device which operates the *choke valve* ([3.2.30](#)) automatically depending on the temperature of the engine

3.2.33

venturi

venturi tube

nozzle with throat which produces low pressure of charge air for fuel injection

3.2.34

venturi diameter

diameter of throat of the *venturi* ([3.2.33](#))

3.2.35

single venturi

venturi ([3.2.33](#)) of one part

3.2.36

double venturi

unified *venturi* ([3.2.33](#)) from two venturis

3.2.37

triple venturi

unified *venturi* ([3.2.33](#)) from three venturis

3.2.38

primary venturi

smallest *venturi* ([3.2.33](#)) of *double venturi* ([3.2.36](#)) or *triple venturi* ([3.2.37](#))

3.2.39

secondary venturi

venturi ([3.2.33](#)) larger than *primary venturi* ([3.2.38](#)) in *double venturi* ([3.2.36](#)) or *triple venturi* ([3.2.37](#))

3.2.40**third venturi**

largest *venturi* (3.2.33) of *triple venturi* (3.2.37)

3.2.41**throttle valve**

throttle butterfly

part included in the *carburettor* (3.2.1) which controls the flow rate of air-fuel mixture into the engine

3.2.42**air valve**

air damper

damper which is equipped in the second stage of the *two-barrel carburettor* (3.2.13) for the control of air-fuel mixture

3.2.43**float chamber**

float bowl

chamber containing fuel with the *float* (3.2.46) which maintains the fuel level

3.2.44**float chamber vent**

pipe or *hole* (3.2.66) to introduce air pressure into the upper space of the *float chamber* (3.2.43)

3.2.45**outer vent**

float chamber vent (3.2.44) connected to the atmosphere

3.2.46**float**

pontoon

part to maintain the level of fuel in the *float chamber* (3.2.43)

3.2.47**float valve**

float needle valve

valve which detects the movement of the *float* (3.2.46) and controls the level of fuel in the *float chamber* (3.2.43)

3.2.48**float-level height**

distance of the upper or lower surface of the *float* (3.2.46) from a certain reference surface of the *float chamber* (3.2.43)

3.2.49**fuel-level height**

level of fuel measured from a certain reference surface of the *float chamber* (3.2.43)

3.2.50**jet**

metering jet

metering orifice

<general term> orifice used in the *carburettor* (3.2.1) which controls fuel flow or air flow

3.2.51**fuel jet**

petrol jet

fuel-metering jet

jet (3.2.50) which controls the fuel flow

3.2.52

air jet

air bleed

well vent jet

jet ([3.2.50](#)) which controls bleed air flow

3.2.53

needle jet

jet ([3.2.50](#)) with a *jet needle* ([3.2.54](#))

3.2.54

jet needle

fine bar installed in the *hole* ([3.2.66](#)) of a *jet* ([3.2.50](#)) to control the passage area of the fluid

3.2.55

main jet

main metering jet

jet ([3.2.50](#)) for the *main metering system* ([3.2.17](#))

3.2.56

slow running jet

slow speed jet

idling jet

jet ([3.2.50](#)) for *slow speed system* ([3.2.18](#))

3.2.57

secondary slow jet

jet ([3.2.50](#)) for *secondary idle system* ([3.2.19](#))

3.2.58

power bypass jet

power jet

jet ([3.2.50](#)) for *power system* ([3.2.20](#))

3.2.59

power valve

power jet valve

valve to control the fuel flow of the *power system* ([3.2.20](#))

3.2.60

pump jet

accelerating pump jet

jet ([3.2.50](#)) in the *accelerating system* ([3.2.22](#))

3.2.61

starting petrol jet

jet ([3.2.50](#)) for the *starting system* ([3.2.21](#))

3.2.62

main air bleed

main air jet

jet ([3.2.50](#)) which bleeds air from the *main metering system* ([3.2.17](#))

3.2.63

nozzle

discharge jet

discharge tube

nozzle to discharge fuel into charge air flow

3.2.64**main nozzle**

main discharge nozzle

nozzle (3.2.63) in the main metering system**3.2.65****pump discharge nozzle***nozzle* (3.2.63) in the *accelerating system* (3.2.22)**3.2.66****port***hole* (3.2.66) for injecting fuel on the air passage of the *carburettor* (3.2.1)**3.2.67****idle port**

idle discharge hole

port (3.2.66) for *slow speed system* (3.2.18)**3.2.68****progression hole**

secondary idle orifice

two-hole type *idle port* (3.2.67) located on the upper side of the air passage**3.2.69****primary idle orifice**

idle discharge hole

two-hole type *idle port* (3.2.67) located on the lower side of the air passage**3.2.70****secondary throttle barrel bypass hole***port* (3.2.66) for *secondary idle system* (3.2.19)**3.2.71****starting mixture supply port**

outlet for starting mixture

port (3.2.66) for *starting system* (3.2.21)**3.2.72****starting valve**

valve which opens and closes the bypass line to supply fuel-rich mixture during starting of the engine

3.2.73**idle adjustment system**

idling speed adjustment system

system for adjustment of carburettor and/or *fuel injection system* (3.3.1) for smooth idling operation**3.2.74****idle needle valve**

idle adjustment screw

screw for adjustment of the air-fuel ratio of the air-fuel mixture

3.2.75**idle limiter**

idle stopper

device which limits the movement of the *idle needle valve* (3.2.74) to avoid a too-rich air-fuel ratio**3.2.76****throttle-stop screw**

idle-adjustment screw

screw which adjusts the opening of the *throttle valve* (3.2.41) at idling operation

3.2.77

fast idle system

device to keep opening of the *throttle valve* (3.2.41) above a certain limit to continue smooth idling operation without stopping at warming-up of the engine

3.2.78

hot idle compensator

compensation device to avoid too-rich air-fuel ratio caused by an inlet air temperature rise during idling

3.2.79

choke valve opener

device which forcibly opens the *choke valve* (3.2.30) during full throttle operation

3.2.80

air bleed system

system which injects a small amount of air into the fuel line to compensate the air-fuel ratio and to aid in the atomization of the fuel

3.2.81

bleed hole in needle jet

hole (3.2.66) to bleed air in the *main metering system* (3.2.17)

3.2.82

idle air bleed

idle air bleeder

pilot air bleed

hole (3.2.66) to bleed air in the *slow speed system* (3.2.18)

3.2.83

step air bleed

secondary air bleed

hole (3.2.66) to bleed air in the *secondary idle system* (3.2.19)

3.2.84

starting air jet

hole (3.2.67) to bleed air in the *starting system* (3.2.21)

3.2.85

acceleration pump

pump which supplies additional fuel at the time of rapid acceleration of the engine

3.2.86

main well

reserve well

fuel pool downstream of the *main jet* (3.2.55)

3.2.87

anti-percolator

device to avoid percolation in the fuel system

Note 1 to entry: During operation of spark ignition engines, if the fuel is vaporised excessively between the fuel tank and the carburettor, the pressure in the fuel line increases and brings about excessive fuel supply to the engine. Such a phenomenon is called percolation.

3.2.88

altitude mixture control valve

high-altitude compensator

valve which prevents an excessive rich air-fuel mixture at high altitude

3.2.89**vaporizer**

converter

unit which vaporizes liquefied gas fuel used for gas-fuelled engines

3.2.90**gas mixer**

unit which mixes gas fuel and inlet air and also controls the air-fuel ratio

3.3 Fuel injection system**3.3.1****fuel injection system**

system for injecting a certain amount of fuel into the combustion chamber under high pressure

3.3.2**electronic control fuel injection system***fuel injection system* (3.3.1) in which parameters, such as fuel flow and injection timing, are controlled with electronic circuits**3.3.3****individual (fuel) injection system**

unit pump fuel injection system

fuel injection system (3.3.1) in which each cylinder is equipped with a dedicated *fuel injection pump* (3.3.7)**3.3.4****common rail (fuel) injection system***fuel injection system* (3.3.1) in which fuel is distributed and injected to each cylinder from a common high-pressure accumulator installed after the *fuel injection pump* (3.3.7)**3.3.5****continuous-flow (fuel) injection system***fuel injection system* (3.3.1) in which fuel flows continuously**3.3.6****timed (fuel) injection system***fuel injection system* (3.3.1) which supplies fuel to the engine intermittently**3.3.7****fuel injection pump**pump for injecting fuel into the cylinder through the *fuel injection valve* (3.3.82)Note 1 to entry: A *fuel injection valve* (3.3.82) is commonly called a fuel injector.**3.3.8****constant-stroke fuel injection pump***fuel injection pump* (3.3.7) with a constant stroke plunger**3.3.9****variable-stroke fuel injection pump***fuel injection pump* (3.3.7) with a variable stroke plunger**3.3.10****jerk fuel injection pump**

plunger-type fuel injection pump

3.3.11**distributor-type fuel injection pump***fuel injection pump* (3.3.7) with one pressurizing unit that distributes fuel to more than one cylinder through a distributing device

3.3.12

unit injector

assembly which combines the features of a single-cylinder pump and an injector in one unit through which a metered volume of fuel under high pressure is injected into the combustion chamber

[SOURCE: ISO 7876-3:1993, 3.1, modified — Note to entry and example removed.]

3.3.13

accumulator fuel injection pump

fuel injection pump (3.3.7) in which the force required to move the *plunger* (3.3.30) is received from an energy accumulator

[SOURCE: ISO 7876-1:1990, 4.2]

3.3.14

single-cylinder fuel injection pump

fuel injection pump (3.3.7) with only one *pumping element* (3.3.29) and one outlet

[SOURCE: ISO 7876-1:1990, 7.1, modified — Note to entry removed.]

3.3.15

multi-cylinder fuel injection pump

integrated fuel injection pump with more than one *pumping element* (3.3.29) and fuel outlets corresponding to the number of engine cylinders

3.3.16

in-line fuel injection pump

injection pump having the axes of its *pumping elements* (3.3.29) arranged parallel to each other and in one plane

[SOURCE: ISO 7876-1:1990, 7.2]

3.3.17

driveshaft fuel injection pump

mechanical injection pump with an integral shaft or camshaft for actuating the *plunger(s)* (3.3.30) of the *pumping element(s)* (3.3.29)

Note 1 to entry: Such a pump may also consist of a separate cambox with a number of individual fuel injection pumps mounted on it.

[SOURCE: ISO 7876-1:1990, 6.3, modified — Note 1 to entry revised.]

3.3.18

vee fuel injection pump

driveshaft fuel injection pump (3.3.16) with two pumping element banks inclined at an angle to each other (with a single camshaft)

[SOURCE: ISO 7876-1:1990, 7.4]

3.3.19

camshaft pump

self-contained drive pump

fuel injection pump (3.3.7) with a camshaft which drives the *plunger* (3.3.30)

3.3.20

camless pump

fuel injection pump (3.3.7) without a camshaft which drives the *plunger* (3.3.30)

3.3.21**metering**

process of establishing any required fuel delivery within the operating range of the *fuel injection system* (3.3.1) using various means of control

[SOURCE: ISO 7876-1:1990, 10.1]

3.3.22**port and helix metering**

system of *metering* (3.3.21) by means of one or more oblique grooves in the *plunger* (3.3.30) and one or more *ports* (3.2.67) in the barrel, or inversely

[SOURCE: ISO 7876-1:1990, 10.2]

3.3.23**sleeve metering**

system of *metering* (3.3.21) incorporating a movable sleeve by which the port opening and/or closing is controlled

[SOURCE: ISO 7876-1:1990, 10.3]

3.3.24**inlet metering**

system of *metering* (3.3.21) by controlling the amount of fuel entering the pumping chamber during the filling or charging portion of the pump cycle

[SOURCE: ISO 7876-1:1990, 10.4]

3.3.25**overflow-type metering**

metering (3.3.21) by bypassing the excess fuel from the *spill valve* (3.3.40) or the *spill port* (3.3.41)

3.3.26**spill valve metering**

metering (3.3.21) by changing the operation timing of the *spill valve* (3.3.40) or the inlet valve

3.3.27**ported metering**

metering (3.3.21) by changing the opening of the spill hole

3.3.28**throttle valve metering**

metering (3.3.21) by changing the opening of the *spill valve* (3.3.40) or the inlet valve

3.3.29**pumping element**

combination of a pumping plunger and its barrel in a *fuel injection pump* (3.3.7)

[SOURCE: ISO 7876-1:1990, 11.2, modified]

3.3.30**plunger**

piston which moves in a barrel and pressurizes the fuel in a *pumping element* (3.3.29)

3.3.31**plunger barrel**

cylinder in which the *plunger* (3.3.30) moves up and down and pressurizes the fuel

3.3.32

helical groove

plunger helix

metering helix

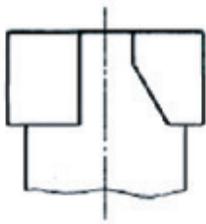
helical groove carved on the *plunger* (3.3.30) to control *metering* (3.3.21) of fuel

3.3.33

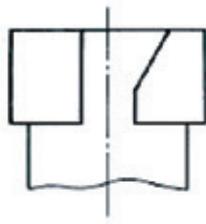
helix lead

helical lead of *plunger helix* (3.3.32)

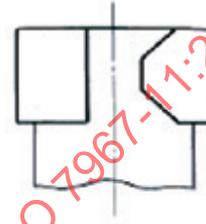
Note 1 to entry: See [Figure 3](#).



a) lower helix lead (3.3.34)



b) upper helix lead (3.3.35)



c) upper and lower helix lead (3.3.36)

Figure 3 — Helix lead

3.3.34

lower helix lead

helix lead (3.3.33) provided at the lower edge to adjust *end of delivery* (3.3.55)

3.3.35

upper helix lead

helix lead (3.3.33) provided at the upper edge to adjust *beginning of delivery* (3.3.54)

3.3.36

upper and lower helix lead

helix lead (3.3.33) provided at both upper and lower edges to adjust *beginning of delivery* (3.3.54) and *end of delivery* (3.3.55)

3.3.37

plunger spring

spring which makes the *plunger* (3.3.30) return to the bottom and keeps the tappet roller touching the cam

3.3.38

delivery valve

check valve provided at the exit of the *fuel injection pump* (3.3.7)

3.3.39

retraction valve

unloading delivery valve

valve for retracting the fuel, usually included in the *delivery valve* (3.3.38)

3.3.40

spill valve

bypass valve

valve which controls the end of fuel delivery in *overflow-type metering* (3.3.25) or *spill valve metering* (3.3.26)

3.3.41**spill port**

cut-off port

bypass port

port (3.2.67) which controls the beginning or the end of fuel delivery in *overflow-type metering* (3.3.25) or *spill valve metering* (3.3.26)

3.3.42**two-way delivery valve**

constant pressure delivery valve

delivery valve (3.3.38) with the additional check valve which works to control the fuel pressure in the *delivery pipe* (3.3.49) constant

3.3.43**accumulator**

container of the high-pressure fuel which maintains constant fuel pressure in the system

3.3.44**control rod**

control rack

rod to adjust the amount of injected fuel

3.3.45**control rod stopper**

stopper to restrict the movement of the *control rod* (3.3.44) to avoid excess fuel injection to the engine

3.3.46**injection pump cam**

cam which drives the *plunger* (3.3.30) of the *fuel injection pump* (3.3.7)

3.3.47**fuel cam**

cam which drives the fuel supply pump, *fuel injection pump* (3.3.7) or *fuel injection valve* (3.3.82)

3.3.48**injection pump tappet**

part which transmits the movement of the cam to the *plunger* (3.3.30)

3.3.49**high-pressure injection pipe**

delivery pipe

fuel injection tubing

fuel injection tubing pipe which connects the *fuel injection pump* (3.3.7) and *fuel injection valve* (3.3.82)

Note 1 to entry: A fuel injection valve is commonly called a fuel injector.

3.3.50**leak-off pipe**

fuel return pipe

pipe which returns bypass fuel or leaked fuel from the injection equipment to the fuel supply line

3.3.51**injection timing device**

device which adjusts the fuel injection timing during engine operation

3.3.52**plunger stroke**

total displacement of the *plunger* (3.3.30) determined by cam lift

3.3.53

effective stroke

displacement of the *plunger* (3.3.30) between the *beginning of delivery* (3.3.54) and the *end of delivery* (3.3.55)

3.3.54

beginning of delivery

instant when the *plunger* (3.3.30) closes the fuel inlet port

3.3.55

end of delivery

instant when the *plunger* (3.3.30) opens the fuel exit port

3.3.56

duration of delivery

period between the *beginning of delivery* (3.3.54) and the *end of delivery* (3.3.55)

3.3.57

static injection timing

<generic term> geometrically determined *beginning of delivery* (3.3.54) and *end of delivery* (3.3.55), which depends on the structure of the *fuel injection pump* (3.3.7)

3.3.58

dynamic injection timing

<generic term> actual *beginning of delivery* (3.3.54) and *end of delivery* (3.3.55) observed during engine operation

3.3.59

fuel injection beginning

instant of actual beginning of fuel injection into the engine cylinder, usually expressed by the crankshaft angle from the top dead centre

3.3.60

fuel injection end

instant of actual end of fuel injection into the engine cylinder, usually expressed by the crankshaft angle from the top dead centre

3.3.61

fuel injection period

fuel injection duration
actual period (duration) of fuel injection into the cylinder, expressed by the crankshaft angle

3.3.62

injection time lag

injection time delay
difference of time between the *beginning of delivery* (3.3.54) and *fuel injection beginning* (3.3.59), usually expressed by the crankshaft angle

3.3.63

injection quantity

quantity of fuel injected into the cylinder from the injection nozzle (injector)

3.3.64

minimum injection limit

minimum regular delivery
minimum discharge injection
limit of minimum fuel flow which can be controlled by the *fuel injection system* (3.3.1)

3.3.65

main injection

injection of major amount of fuel to the engine

3.3.66**pilot injection**

injection of a small amount of fuel prior to the *main injection* (3.3.65), usually for the reduction of exhaust emissions or engine noise

3.3.67**post injection**

intentional injection of a small amount of fuel after the *main injection* (3.3.65), usually for the reduction of exhaust emissions

3.3.68**secondary injection**

abnormal fuel injection which occurs after the *main injection* (3.3.65) caused by residual pressure waves in the high-pressure pipe line connecting *fuel injection pump* (3.3.7) and *fuel injection valve* (3.3.82)

3.3.69**irregular injection**

cyclic irregularity of injection

abnormal cyclic change of injection fuel flow during constant fuel operation

3.3.70**intermittent injection**

irregular injection (3.3.69) with stoppage of fuel injection

3.3.71**cut-off of injection**

condition around the fuel nozzle at the time of cut-off of fuel

Note 1 to entry: Conditions can include *dribbling* (3.3.72).

3.3.72**dribbling**

after-dripping

subsequent dripping

small leakage of fuel just after the end of injection

3.3.73**retraction**

line-pressure relief unloading

sudden decrease of fuel pressure in the *injection pipe* (3.3.49) just after the *cut-off of injection* (3.3.71), in order to avoid *dribbling* (3.3.72)

3.3.74**retraction volume**

increased volume of high-pressure fuel inside the *injection pipe* (3.3.49), from the *delivery valve* (3.3.38) to the *fuel injection valve* (3.3.82), by the movement of the *retraction valve* (3.3.39)

3.3.75**maximum fuel stop**

full-load stopper

device for limiting the maximum fuel flow at the full load of the engine

3.3.76**inequality rate of fuel injection (from cylinder to cylinder)**

δ_q

value which indicates inequality of fuel injection between cylinders for distributor type or multi-cylinder fuel injection system

Note 1 to entry: $\delta_q = (Q_{\max} - Q_m)/Q_m \times 100(>0)$ or $\delta_q = (Q_{\min} - Q_m)/Q_m \times 100(<0)$

where

δ_q is the inequality rate of fuel injection (from cylinder to cylinder), expressed in %;

Q_m is the average fuel injection flow rate for all cylinders;

Q_{max} is the maximum fuel injection flow rate in all cylinders;

Q_{min} is the minimum fuel injection flow rate in all cylinders.

3.3.77

deviation rate of fuel injection

δ_e
value which indicates the rate of deviation of the measured fuel injection from the scheduled fuel injection for a single cylinder fuel injection system

Note 1 to entry: $\delta_e = (Q_a - Q_s)/Q_s \times 100$

where

δ_e is the deviation rate of fuel injection;

Q_a is the measured fuel injection;

Q_s is the scheduled fuel injection.

3.3.78

rate of injection

rate of discharge

injection rate

instantaneous injection fuel flow rate during the *fuel injection period* ([3.3.61](#))

Note 1 to entry: Rate of injection can be expressed as injection fuel quantity per rotation angle of camshaft or crankshaft.

3.3.79

injection interval

fuel injection interval during operation of the multi-cylinder engine, usually expressed with rotation angle of the crankshaft

3.3.80

injection order

order of fuel injection of the pump elements for the multi-cylinder injection pump

Note 1 to entry: The order is counted from the driving side.

3.3.81

excess fuel device

excess fuel starting device

device which enables the fuel system to inject more fuel than that of full load at starting of the engine

3.3.82

fuel injection valve

fuel injector

device for injection and atomizing of fuel

3.3.83

open nozzle

fuel injection valve ([3.3.82](#)), without the valve, which controls the opening pressure between the injection pump and the injection valve

3.3.84**closed nozzle**

fuel injection valve (3.3.82), with the valve, which controls the opening pressure between the injection pump and the injection valve

3.3.85**automatic injection valve**

fuel injection valve (3.3.82) which automatically opens or closes depending on inlet fuel pressure

3.3.86**mechanical injection valve**

fuel injection valve (3.3.82) which mechanically opens or closes independently of inlet fuel pressure

3.3.87**electromagnetic injector**

fuel injection valve (3.3.82) which operates with electromagnetic force, usually produced by the electromagnetic actuator or solenoid valve

3.3.88**piezo injector**

injector which is operated by a piezoelectric actuator

3.3.89**fuel injection nozzle**

nozzle valve assembly

main part of the *fuel injection valve* (3.3.82), which consists of the *nozzle* (3.2.64), *nozzle tip* (3.3.92) and needle valve

Note 1 to entry: See [Figure 4](#).

**Key**

1 *nozzle tip* (3.3.92)

Figure 4 — Fuel injection nozzle

3.3.90**nozzle body**

portion of the *nozzle* (3.2.64) which guides the needle valve

3.3.91

nozzle needle

valve needle

valve with sharp tip which is a part of the *nozzle* (3.2.64)

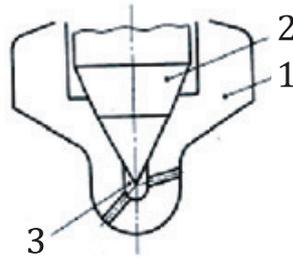
3.3.92

nozzle tip

spray tip

part of the *nozzle* (3.2.64) with a fuel injection hole

Note 1 to entry: See [Figure 4](#) and [Figure 5](#).



Key

- 1 *nozzle body* (3.3.90)
- 2 *nozzle needle* (3.3.91)
- 3 *nozzle sac* (3.3.93)

Figure 5 — Nozzle tip

3.3.93

nozzle sac

space inside the *nozzle tip* (3.3.92) of a multi-hole nozzle between the needle valve and the fuel injection hole

3.3.94

pintle nozzle

nozzle (3.2.64) which has a needle with a profiled protrusion (the pintle) which extends through a coaxial hole in the body

Note 1 to entry: See [Figure 6](#).

[SOURCE: ISO 7876-2:1991, 8.1, modified — Note 1 to entry added.]

3.3.95

throttle nozzle

pintle nozzle (3.3.94) with a needle protrusion profile which throttles the fuel flow during initial lift of the needle

Note 1 to entry: See [Figure 6](#).

[SOURCE: ISO 7876-2:1991, 8.2, modified — Note 1 to entry added.]

3.3.96

hole nozzle

nozzle (3.2.64) with one or more injection holes

Note 1 to entry: This is the general term for nozzles other than *pintle nozzles* (3.3.94).

Note 2 to entry: See [Figure 6](#).

3.3.97**long-stem nozzle**

hole nozzle (3.3.96) with a relatively long distance between the sliding portion and the valve seat of the needle valve

Note 1 to entry: See [Figure 6](#).

3.3.98**poppet nozzle**

nozzle (3.2.64) which has a mushroom-shaped needle valve (poppet valve)

Note 1 to entry: See [Figure 6](#).

3.3.99**internal cooled nozzle**

nozzle (3.2.64) with internal cooling configuration

3.3.100**nozzle sleeve**

sleeve of internally cooling nozzle which forms a cooling chamber

3.3.101**nozzle hole**

hole (3.2.67) for fuel injection in a *nozzle* (3.2.64)

3.3.102**hole angle**

conic angle formed by the centrelines of the injection holes in a multi-hole nozzle

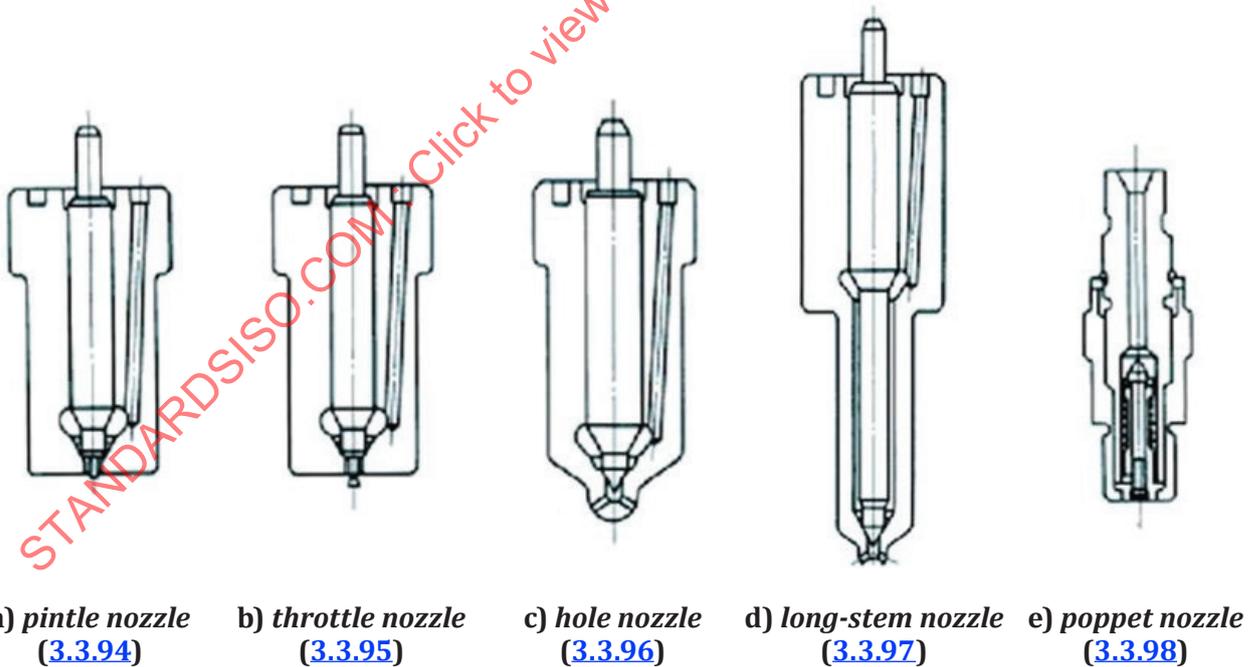


Figure 6 — Fuel injection nozzles

3.3.103**nozzle holder**

part which supports the *nozzle* (3.2.64)