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Reciprocating internal combustion engines — Vocabulary of components and systems —

Part 11: Fuel systems

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

Partie 11: Systèmes de carburant

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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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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: Foreword — Supplementary information.

The committee responsible for this document is ISO/TC 70, *Internal combustion engines*.

ISO 7967 consists of the following parts, under the general title *Reciprocating internal combustion engines — Vocabulary of components and systems:*

— *Part 1: Structure and external covers*

— *Part 2: Main running gear*

— *Part 3: Valves, camshaft drives and actuating mechanisms*

— *Part 4: Pressure charging and air/exhaust gas ducting systems*

— *Part 5: Cooling systems*

— *Part 6: Lubricating systems*

— *Part 7: Governing systems*

— *Part 8: Starting systems*

— *Part 9: Control and monitoring systems*

— *Part 10: Ignition systems*

— *Part 11: Fuel systems*

— *Part 12: Exhaust emission control systems*

Reciprocating internal combustion engines — Vocabulary of components and systems —

Part 11: Fuel systems

1 Scope

This part of ISO 7967 establishes a vocabulary for fuel systems of reciprocating internal combustion engines. Also, in this part of ISO 7967, the terms and the definitions are classified as follows:

— fuel supply system (3.1);

— carburetor (3.2);

— fuel injection system (3.3).

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

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 7876-1:1990, *Fuel injection equipment — Vocabulary — Part 1: Fuel injection pumps*

ISO 7876-3:1993, *Fuel injection equipment — Vocabulary — Part 3: Unit injectors*

ISO 7876-5, *Fuel injection equipment — Vocabulary — Part 5: Common rail fuel injection system*

3 Terms and definitions

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 through one or several filters, to the high-pressure-generating components

[SOURCE: ISO 7876-5:2004, 2.2]

3.1.3
fuel filter
filter to eliminate contamination in the fuel

3.1.4
priming pump
pump to fill the fuel pipe at starting

3.2 Carburetor

3.2.1
carburetor
device which vaporizes fuel into charge air and also controls air-fuel ratio of the mixture

3.2.2
elementary carburetor
carburetor (3.2.1) without compensation device which consists of the main system, the float unit, the *venturi* (3.2.34), and the *throttle valve* (3.2.42)

3.2.3
float carburetor
carburetor (3.2.1) in which the fuel level is maintained at the constant level by the *float* (3.2.47) and the fuel is absorbed in the air by the vacuum pressure at the *venturi* (3.2.34)

3.2.4
electronic controlled carburetor
carburetor (3.2.1) which controls air-fuel ratio by the electronic circuit

3.2.5
air-fuel ratio feedback controlled carburetor
carburetor (3.2.1) which is equipped with the device for feedback control of air-fuel ratio

3.2.6
fixed-venturi carburetor
carburetor (3.2.1) with fixed area venturi

3.2.7
variable venturi carburetor
carburetor (3.2.1) with variable area venturi

3.2.8
updraft carburetor
carburetor (3.2.1) with upward exit of air-fuel mixture

3.2.9
downdraft carburetor
carburetor (3.2.1) with downward exit of air-fuel mixture

3.2.10
horizontal carburetor
sidedraft carburetor
carburetor (3.2.1) with horizontal exit of air-fuel mixture

3.2.11
single-barrel carburetor
carburetor (3.2.1) with one set of *venturi* (3.2.34)

3.2.12
multi-barrel carburetor
carburetor (3.2.1) with more than two sets of *venturi* (3.2.34)

3.2.13
two-barrel carburetor
carburetor (3.2.1) with two sets of *venturi* (3.2.34)

3.2.14
compound carburetor
multiple carburetor
multi-carburetor
carburetor system with more than two sets of independent *carburetors* (3.2.1) in which *throttle valves* (3.2.42) are linked so as to work simultaneously or in sequence

Note 1 to entry: The unit with two carburetors is called twin-carburetor.

3.2.15
two-stage carburetor
carburetor system with two *carburetors* (3.2.1) with different characteristics in which each *throttle valve* (3.2.42) works in sequence

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

3.2.16
float circuit
float system
mechanism which maintains the level of fuel in the *carburetor* (3.2.1)

3.2.17
main metering system
main circuit
high-speed system
high-speed circuit
circuit in the *carburetor* (3.2.1) where fuel flows continuously during normal engine operation, except idling

3.2.18
slow speed system
idle system
idle circuit
circuit in the *carburetor* (3.2.1) where fuel flows at idling

3.2.19
secondary idle system
secondary low speed system
circuit of the secondary *carburetor* (3.2.1) where fuel flows from the main fuel circuit when the opening of the *throttle valve* (3.2.42) 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 *carburetor* (3.2.1) which restricts the air flow in the *venturi* (3.2.34) 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 *air bleed* (3.2.53) method

3.2.24
bore size of throttle-body flange
throttle-diameter
diameter of the exit of the *carburetor* (3.2.1) which indicates the size of the carburetor

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

3.2.25
carburetor body
main body of carburetor
body including main parts of the *carburetor* (3.2.1) such as *venturi* (3.2.34) and *float chamber* (3.2.44)

3.2.26
air intake body
body which forms *air intake* (3.2.28) passage with the *choke valve* (3.2.31)

3.2.27
flange body
throttle body
body which forms the exit of air passage with *throttle valve* (3.2.42)

3.2.28
air horn
air intake
air intake portion of the *carburetor* (3.2.1)

3.2.30
choke
choking
means to enrich the air-fuel mixture by choking the inlet of charge air to the *carburetor* (3.2.1)

3.2.31
choke valve
strangler valve
air shutter
valve for *choking* (3.2.30) the air inlet in the *carburetor* (3.2.1)

3.2.32
choke relief valve
valve equipped in the *choke valve* (3.2.31) which relieves charge air when air-fuel ratio exceeds the limit due to excessive negative pressure at the *venturi* (3.2.34)

3.2.33
automatic choke
device which operates *choke valve* (3.2.31) automatically depending on the temperature of the engine

3.2.34
venturi
venturi tube
nozzle (3.2.64) with throat which produces low pressure of charge air for fuel injection

3.2.35
venturi diameter
diameter of throat of *venturi* (3.2.34)

3.2.36
single venturi
venturi (3.2.34) of one part

3.2.37
double venturi
unified *venturi* (3.2.34) from two venturis

3.2.38
triple venturi
unified *venturi* (3.2.34) from three venturis

3.2.39
primary venturi
smallest *venturi* (3.2.34) of *double venturi* (3.2.37) or *triple venturi* (3.2.38)

3.2.40
secondary venturi
venturi (3.2.34) larger than *primary venturi* (3.2.39) in *double venturi* (3.2.37) or *triple venturi* (3.2.38)

3.2.41
third venturi
largest *venturi* (3.2.34) of *triple venturi* (3.2.38)

3.2.42
throttle valve
throttle butterfly
part included in the *carburetor* (3.2.1) which controls the flow rate of air-fuel mixture into the engine

3.2.43
air valve
air damper
damper which is equipped in the second stage of *two-barrel carburetor* (3.2.13) for the control of air-fuel mixture

3.2.44
float chamber
float bowl
chamber containing fuel with the *float* (3.2.47) which maintains the fuel level

3.2.45
float chamber vent
pipe or *hole* (3.2.67) to introduce air pressure into the upper space of the *float chamber* (3.2.44)

3.2.46
outer vent
float chamber vent (3.2.45) connected to the atmosphere

3.2.47
float
pontoon
part to maintain the level of fuel in the *float chamber* (3.2.44)

3.2.48
float valve
float needle valve
valve which detects the movement of the *float* (3.2.47) and controls the level of fuel in the *float chamber* (3.2.44)

3.2.49
float-level height
distance of upper or lower surface of the *float* (3.2.47) from a certain reference surface of the *float chamber* (3.2.44)

3.2.50
fuel-level height
level of fuel measured from a certain reference surface of the *float chamber* (3.2.44)

3.2.51
jet
metering jet
metering orifice
<general term> orifice used in the *carburetor* (3.2.1) which controls fuel flow or air flow

3.2.52
fuel jet
petrol jet
fuel metering jet
jet (3.2.51) which controls the fuel flow

3.2.53
air jet
air bleed
well vent jet
jet (3.2.51) which controls bleed air flow

3.2.54
needle jet
jet (3.2.51) with *jet needle* (3.2.55)

3.2.55
jet needle
fine bar installed in the *hole* (3.2.67) of a *jet* (3.2.51) to control the passage area of the fluid

3.2.56
main jet
main-metering jet
jet (3.2.51) for the *main metering system* (3.2.17)

3.2.57
slow running jet
slow speed jet
idling jet
jet (3.2.51) for *slow speed system* (3.2.18)

3.2.58
secondary slow jet
jet (3.2.51) for *secondary idle system* (3.2.19)

3.2.59
power by-pass jet
power jet
jet (3.2.51) for *power system* (3.2.20)

3.2.60
power valve
power jet valve
valve to control the fuel flow of the *power system* (3.2.20)

3.2.61
pump jet
accelerating pump jet
jet (3.2.51) in the *accelerating system* (3.2.22)

3.2.62
starting petrol jet
jet (3.2.51) for *starting system* (3.2.21)

3.2.63
main air bleed
main air jet
jet (3.2.51) which bleeds air from the *main metering system* (3.2.17)

3.2.64
nozzle
discharge jet
discharge tube
nozzle to discharge fuel into charge air flow

3.2.65
main nozzle
main discharge nozzle
nozzle (3.2.64) in the main metering system

3.2.66
pump discharge nozzle
nozzle (3.2.64) in the *accelerating system* (3.2.22)

3.2.67
port
hole
hole (3.2.67) for injecting fuel on the air passage of *carburetor* (3.2.1)

3.2.68
idle port
idle discharge hole
port (3.2.67) for *slow speed system* (3.2.18)

3.2.69
progression hole
secondary idle orifice
two-hole type *idle port* (3.2.68) located on the upper side of the air passage

3.2.70
primary idle orifice
idle discharge hole
two-hole type *idle port* (3.2.68) located on the lower side of the air passage

3.2.71
secondary throttle barrel by-pass hole
port (3.2.67) for *secondary idle system* (3.2.19)

3.2.72
starting mixture supply port
outlet for starting mixture
port (3.2.67) for *starting system* (3.2.21)

3.2.73
starting valve
valve which opens and closes the by-pass line to supply fuel rich mixture during starting of the engine

3.2.74
idle adjustment system
idling speed adjustment system
system for adjustment of carburetor and/or *fuel injection system* (3.3.1) for smooth idling operation

3.2.75
idle needle valve
idle adjustment screw
screw for adjustment of air-fuel ratio of air-fuel mixture

3.2.76
idle limiter
idle stopper
device which limits the movement of the *idle needle valve* (3.2.75) to avoid a too rich air-fuel ratio

3.2.77
throttle-stop screw
idle-adjustment screw
screw which adjusts the opening of the *throttle valve* (3.2.42) at idling operation

3.2.78
fast idle system
device to keep opening of the *throttle valve* (3.2.42) above certain limit to continue smooth idling operation without stopping at warming-up of the engine

3.2.79
hot idle compensator
compensation device to avoid too rich air-fuel ratio caused by inlet air temperature rise during idling

3.2.80
choke valve opener
device which forcibly opens the *choke valve* (3.2.31) during full throttle operation

3.2.81
air bleed system
system which injects small amount of air into fuel line to compensate air-fuel ratio and to aid in the atomization of the fuel

3.2.82
bleed hole in needle jet
hole (3.2.67) to bleed air in the *main metering system* (3.2.17)

3.2.83
idle air bleed
idle air bleeder
pilot air bleed
hole (3.2.67) to bleed air in the *slow speed system* (3.2.18)

3.2.84
step air bleed
secondary air bleed
hole (3.2.67) to bleed air in the *secondary idle system* (3.2.19)

3.2.85
starting air jet
hole (3.2.67) to bleed air in the *starting system* (3.2.21)

3.2.86
acceleration pump
pump which supplies additional fuel at the time of rapid acceleration of the engine

3.2.87
main well
reserve well
fuel pool downstream of *main jet* (3.2.56)

3.2.88
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 carburetor, the pressure in the fuel line increases and brings about excessive fuel supply to the engine. Such a phenomenon is called percolation.

3.2.89
altitude mixture control valve
high altitude compensator
valve which prevents excessive rich air-fuel mixture at high altitude

3.2.90
vaporizer
converter
unit which vaporizes liquefied gas fuel used for gas fuelled engines

3.2.91
gas mixer
unit which mixes gas fuel and inlet air and also controls air-fuel ratio

3.3 Fuel injection system

3.3.1
fuel injection system
system for injecting fuel into an engine

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

3.3.4
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 manifold installed after the *fuel injection pump* (3.3.7)

Note 1 to entry: For details, refer to ISO 7876-5.

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 *fuel injection valve* (3.3.82) (commonly called 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 and 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]

Note 1 to entry: For details, refer to ISO 7876-3:1993.

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 directly 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]

3.3.15
multi-cylinder fuel injection pump
integrated fuel injection pump with more than one *pumping elements* (3.3.29) and fuel outlets corresponding to the number of engine cylinder

3.3.16
in-line fuel injection pump
fuel injection pump assembly 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)

[SOURCE: ISO 7876-1:1990, 6.3]

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 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
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
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
metering method by controlling the amount of fuel entering the pumping chamber during the filling or charging of the pump cycle

Note 1 to entry: Refer to ISO 7876-1:1990, 10.4.

3.3.25
over-flow type metering
metering (3.3.21) by by-passing 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]

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)

3.3.34
lower helix lead
helix lead (3.3.33) provided at the lower edge to adjust *fuel injection end* (3.3.60)

3.3.35
upper helix lead
helix lead (3.3.33) provided at the upper edge to adjust *fuel injection beginning* (3.3.59)

3.3.36
upper and lower helix lead
helix lead (3.3.33) provided at both upper and lower edges to adjust *fuel injection beginning* (3.3.59) and *fuel injection end* (3.3.60)

3.3.37
plunger spring
spring which makes the *plunger* (3.3.30) return to the bottom and keeps the tappet roller touch with the cam

3.3.38
delivery valve
check valve provided at the exit of the fuel injection pump

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
by-pass valve
valve which controls the end of fuel delivery in *over-flow type metering* (3.3.25) or *spill valve metering* (3.3.26)

3.3.41
spill port
cut-off port
by-pass port
port (3.2.67) which controls the beginning or the end of fuel delivery in *over-flow 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 *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 *fuel injection pump* (3.3.7)

3.3.47
fuel cam
cam which drives 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 cam to the *plunger* (3.3.30)

3.3.49
injection pipe
delivery pipe
fuel injection tubing
pipe which connects *fuel injection pump* (3.3.7) and *fuel injection valve* (3.3.82) (injector)

3.3.50
leak-off pipe
fuel return pipe
pipe which returns by-pass 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 fuel delivery* (3.3.54) and the *end of fuel delivery* (3.3.55)

3.3.54
beginning of delivery
instant when the *plunger* (3.3.30) closes fuel inlet port

3.3.55
end of delivery
instant when the *plunger* (3.3.30) opens 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 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 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 crankshaft angle

3.3.63
injection quantity
quantity of the 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 small amount of fuel prior to *main injection* (3.3.65)

3.3.67
post injection
intentional injection of small amount of fuel after *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)

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 concerning cut-off of fuel at the time of shut down of the engine

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 inside the *injection pipe* (3.3.49) 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
unequality rate of fuel injection (from cylinder to cylinder)
δ_q
value which indicates unequality 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 unequality rate of fuel injection (from cylinder to cylinder), expressed in %;

Q_m average fuel injection flow rate for all cylinders;

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

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

3.3.77
deviation rate of fuel injection
δ_e
value which indicates 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 deviation rate of fuel injection;

Q_a measured fuel injection;

Q_s scheduled fuel injection.

3.3.78
rate of injection
rate of discharge
injection rate
instantaneous injection fuel flow rate during *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 opening pressure between the injection pump and injection valve

3.3.84
closed nozzle
fuel injection valve (3.3.82), with the valve, which controls opening pressure between the injection pump and 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 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 parts of *fuel injection valve* (3.3.82) which consists of *nozzle* (3.2.64), *nozzle tip* (3.3.92), and needle valve

3.3.90
nozzle body
portion of *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 with fuel injection hole which is a part of the *nozzle* (3.2.64)

Note 1 to entry: See Figure 4.

3.3.93
nozzle sac
space inside the *nozzle tip* (3.3.92) of 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

[SOURCE: ISO 7876-2:1991, 8.2]

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

[SOURCE: ISO 7876-2:1991, 8.3]

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 the nozzles other than the *pintle nozzle* (3.3.94).

3.3.97
long-stem nozzle
hole nozzle (3.3.96) with relatively long distance between sliding portion and valve seat of the needle valve

3.3.98
poppet nozzle
nozzle (3.2.64) which has a mushroom shape needle valve(poppet valve)

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 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

3.3.103
nozzle holder
part which supports the *nozzle* (3.2.64)

3.3.104
nozzle assembly nut
nozzle retaining nut
nut for fixing the *nozzle* (3.2.64) to the *nozzle holder* (3.3.103)

3.3.105
injection-valve opening pressure
fuel pressure at the time of opening of the needle valve

3.3.106
injection-valve closing pressure
fuel pressure at the time of closing of the needle valve

3.3.107
fuel injection pressure
fuel pressure inside of the *fuel injection valve* (3.3.82) during fuel injection

3.3.108
fuel injection line pressure
pressure in the fuel injection pipe during fuel injection

3.3.109
residual pressure
average fuel pressure in the *injection pipe* (3.3.49) after the end of fuel injection and before the starting of the next injection

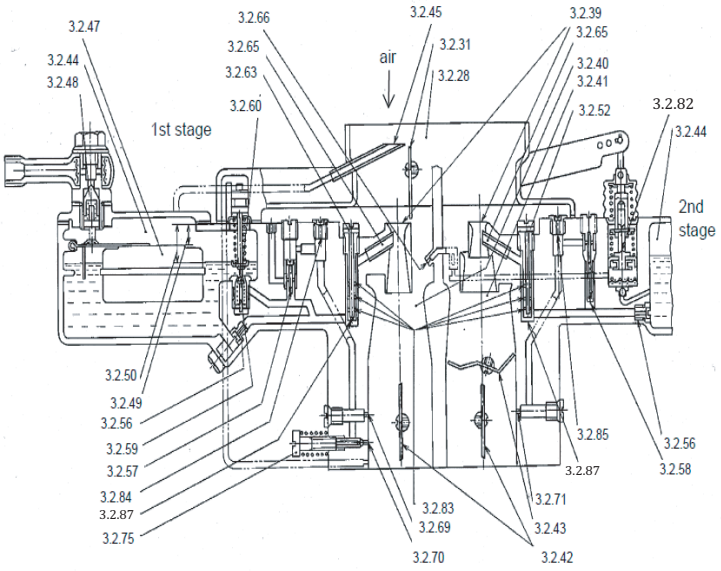

Figure 1 — Two-barrel carburetor

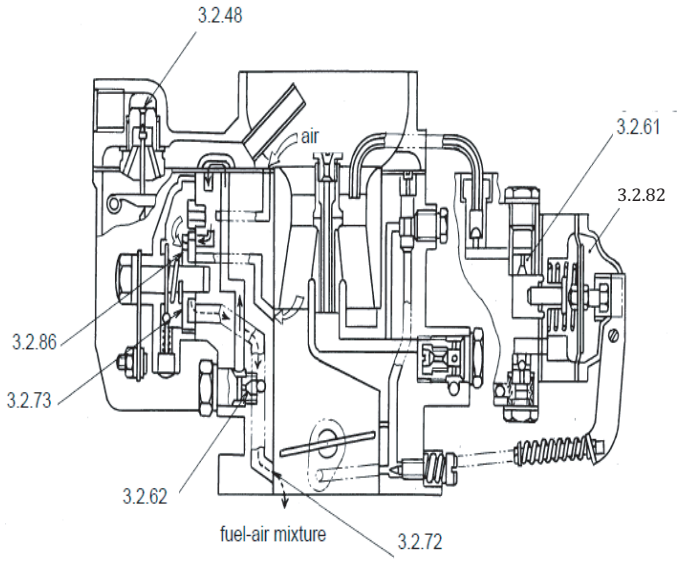

Figure 2 — Single-barrel carburetor

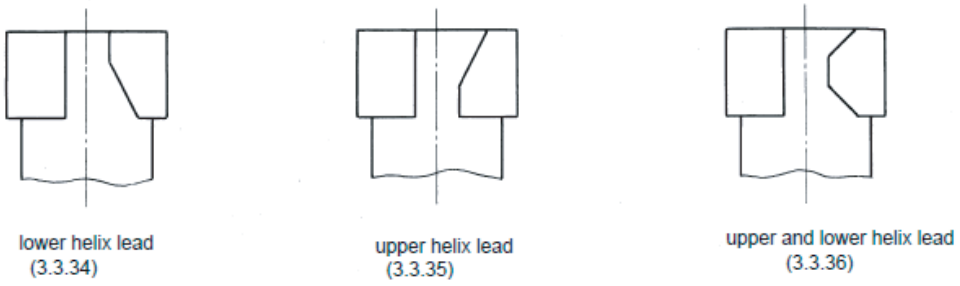

Figure 3 — Helix lead

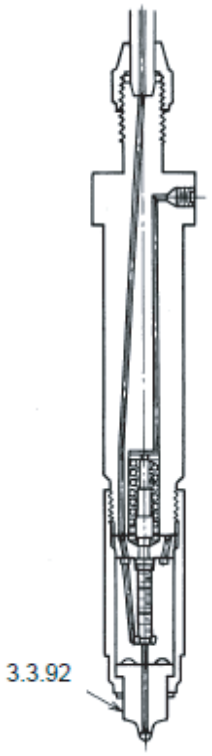

Figure 4 — Fuel injection nozzle

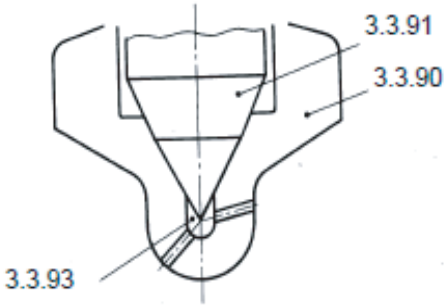

Figure 5 — Nozzle tip

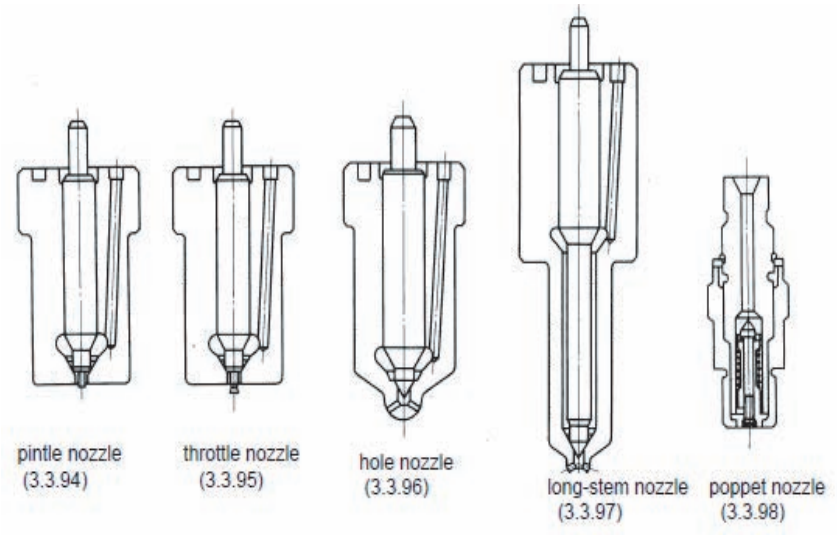

Figure 6 — Fuel injection nozzles

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