

1 FUNCTIONS OF THE CARBURETTOR

The main carburettor functions are:

- To form a proper homogeneous inflammable mixture of fuel and air
- To supply the engine with varying amounts of this mixture

The fuel-air mixture is formed through vapourising and by uniformly spraying fuel into the air-stream or at least by atomising it into very small droplets.

Atomisation takes place in this way: liquid fuel from the atomiser nozzle meets the flow of air which carries it, broken into very fine droplets, to the combustion chamber.

We have spoken of a «proper» mixture because the mixture strength, defined as the amount of air in weight mixed with a fuel unit of weight, must have a precise value, ie it must be within the limits of inflammability so that the mixture can be easily ignited by the spark in the combustion chamber.

Inflammability limits for commercial petrol are: 7:1 (rich limit ie. 7 kgs of air and 1 kg of petrol), down to 20:1 (lean limit ie. 20 kgs of air and 1 kg of petrol).

To obtain optimum combustion between these inflammability limits, a value very close to the so-called stoichiometric value is needed ie. about 14.5-15.0 kgs of air to 1 kg of petrol.

A stoichiometric mixture ratio is one which ensures complete combustion of fuel with only the formation of water and carbon dioxide.

The stoichiometric mixture ratio depends on the kind of fuel used, so if the fuel is changed, this fuel-air ratio will also change (see chapter 5.1).

The selection of the fuel-air ratio is therefore very important both for engine performance and for exhaust emission levels.

The throttle valve (usually a flat or piston-type gate valve, also called a slide) is the main part by which the engine is tuned ie. the engine power output is varied by controlling the amount of mixture being drawn into the cylinder.

During bench tests, the engine is usually run in top gear in two characteristic conditions: full throttle and part throttle.

The full throttle test simulates conditions for a vehicle on a progressive climb with the throttle wide open.

In the bench test, this condition is reproduced by running the engine with the throttle fully open; from this maximum horsepower condition, the engine is braked at various speeds and the specific power and consumption figures are taken.

The part throttle test simulates the conditions for vehicle on a level road at varying speeds.

On the test bench, this condition is simulated by running the engine again from the maximum engine power conditions, but progressively closing the throttle valve of the carburettor.

At various speeds, specific power and consumption figures are taken again.