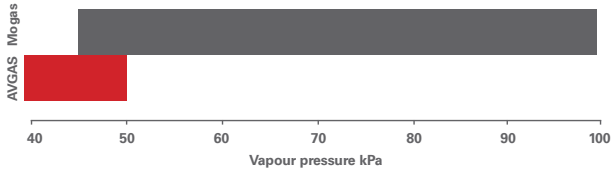
AVGAS

AVGAS / Mogas – different fuels

Air bp has a policy of only supplying aviation gasolines commonly known as 'AVGAS' for aircraft use and not supplying motor gasoline 'Mogas' as used by ground vehicles. This relates to Air bp's commitment to the Aviation Industry where fuels and quality control measures have been specifically developed for flight operations. In this leaflet Air bp sets out its view of why AVGAS is 'The dedicated aviation fuel'.

Additives

Fuel additives may be used to enhance both AVGAS and Mogas performance. The Aviation Industry has put in place stringent procedures for approval of additives with focus on aircraft engines and fuel systems. Only a limited number of chemical types are approved and are strictly regulated. Approval procedures for Mogas are very different and performance in an aviation application often untested or unknown. Equally, some AVGAS additives such as TEL used for octane enhancement, can have a detrimental effect on engines designed to run on Mogas.



AVGAS has a much tighter vapour pressure specification than Mogas

Quality control

An integral part of AVGAS supply is to ensure the fuel reaches the aircraft in good condition, removing dirt and free water which could block filters, cause corrosion or impact engine operation. To meet this goal specific hardware is designed, installed and regulated within the AVGAS distribution network. Aviation industry members continually develop and update quality control procedures, for example through the Joint Inspection Group (JIG). These measures combined with specifications and fuel technology ensure AVGAS is the dedicated aviation fuel.

For flight safety and performance, it is vital to follow manufacturer's fuel recommendations for your aircraft. If AVGAS is your recommended fuel, make sure it's AVGAS in the tank.

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The dedicated aviation fuel

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Fuel specifications

AVGAS specifications were first introduced in 1917 to improve the safety and reliability of flight. Specifications are well aligned and are maintained on an international level, for example ASTM D910 and Defence Standard 91-90, with contributions from all members of the aviation industry, engine and aircraft manufactures, user associations, fuel producers and regulators. This ensures a high level of aviation expertise, safety and quality control.

Mogas specifications are overseen by the automotive industry and focus on ground vehicle operation. Specifications may be developed at a very local level, for example by single states such as California, or cover wide geographical regions such as European specification EN228. Within each specification many further options can exist – for example there are currently 10 different classes of Mogas in Europe with properties changing from winter to summer.

Mogas regulations may also permit or mandate the use of oxygenated fuel components such as ethanol. While acceptable for ground use, such components can be a potential hazard to aviation, risking damage to fuel system hardware and having a low energy content which reduces aircraft range. In addition, water condensing in wing tanks combined with low ambient temperature may cause such a fuel to separate into two layers, a corrosive water/alcohol layer and a hydrocarbon layer of reduced volume and quality.

Fuel octane quality

For a gasoline engine to work correctly the fuel/air mixture must wait for the ignition spark before starting to combust and then burn smoothly to provide power. If the fuel is of poor combustion quality, it may start to explode uncontrollably, a situation known as 'detonation' which could damage the engine. The fuel's ability to resist detonation is measured in terms of octane quality. Significant differences exist between high octane AVGAS grades 100/130 and 100LL when compared to Mogas – AVGAS offers a minimum of 99.6 Motor Octane Number (MON) while Super Unleaded Mogas is typically only 88 MON. Also, the less severe test of Research Octane Number (RON) often quoted for Mogas, typically in the range 95 to 98 RON, is not used. AVGAS features Supercharge, a much more challenging test seeking to maximise power from the fuel, with grades 100/130 and 100LL having a minimum quality of 130 performance number.

Fuel volatility

For good combustion, a gasoline engine seeks a well-mixed combination of fuel and air for ignition by a spark. This requires a compromise – the fuel must be sufficiently volatile to vaporise in the induction system, even when the engine is cold to allow starting, but not be so volatile to cause vapour bubbles in the supply lines which could cause the engine to falter or stop. AVGAS and Mogas have taken very different positions on this compromise as a result of the environment in which each fuel is used.

The volatility of AVGAS is tightly controlled necessitating additional work at the manufacturing refinery to meet specifications. This is due to the extreme ambient conditions over which the fuel must perform, for example adapting to changes in temperature from +30 °C on an airfield to-15 °C at 15000 feet as air pressure falls by 45%. Mogas, however, rarely faces such arduous requirements allowing a very much broader range in volatility and refining process. Indeed, volatility specifications are regularly changed to suit local climates and still offer excellent ground based performance.

Carburettor icing

When a carburettor is used to form the combustible mixture necessary for a spark ignition engine to operate, heat is needed to help vaporise the fuel. This is drawn from the carburettor parts which may cool to such an extent ice forms restricting flow and reducing power. Engines operated on both AVGAS and Mogas can suffer from carburettor icing. However, in the case of AVGAS, the more stringent volatility specifications help the aviation engineer quantify and minimise the effect, including design of remediation measures such as exhaust gas heating.