

Ethanol MoGas use in the Europa Aircraft.

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Ethanol mogas (Aka MoGas) is becoming the US standard in all the United States. Ethanol does increase the octane of cheaper easier to make fuel, but it has its drawbacks. Ethanol attacks fiberglass structures (epoxy, vinyl ester, or polyester binding agents). The Marine industry put up a stiff resistance but slowly even the marine industry will succumb to using fuel with up to 10% ethanol added. Some LSA manufacturers have had to completely change their fuel tanks and fittings due to the US requirement to use up to 10% ethanol in automotive fuel.

We have found some problems with using mogas with the ethanol content at 10%.

Araldite 420 A/B, or Epibond 420 A/B (Aka Redux) securing your screen filters will soften and deteriorate in ethanol. Luckily the deterioration is slow, and it does not melt Redux, but it does permeate it and will eventually leak through. Ethanol does soften pro seal, but it does not fail provided ethanol is 10% or less. Pro Seal says it is still OK to use up to 10%.

Older style carbs will corrode in ethanol if left in the carb over six months (like over winter) without some sort of fuel stabilizer. It appears the ethanol absorbs water from the atmosphere and the water settles in the bottom of the carb float bowls. The water and raw aluminum coating begins corroding in a few weeks.



The photo above is out of a 914 powered Europa. Over three years (aircraft flown little in the winter) using mogas high test 92 octane with less than 10% ethanol.

Other problems with mogas and extended non use is the formation of a growth in the fuel tanks and fuel system. Here is a photo of 10% ethanol taken from a tank on the main side which has been setting three months over the winter in the Central US near Kansas City.



The white clouds are ethanol and water globules in the fuel. Eventually this fuel will clear up and form a water layer on the bottom of the tank. In the water, with ethanol as a food source, a brown fungus has been known to grow on the tank sides and clog filters.

Using MoGas vs. Avgas have many pros and cons. Here are some we have found:

Pros:

Fresh mogas high octane premium will run in the 914 without detonation at 92 octane in cooler environments.

Mogas is cheaper by at least \$2.00 per gallon. That is \$10 per hour flight difference.

Oil changes can be extended to 50 hours.

The engine may be operated with a pure synthetic motor oil for motorcycle engines such as Mobil 1 MX4T which may extend and protect the engine longer, and cleaner.

No need to pull oil can to clean lead buildup. Gearbox stays free of lead.

Valves stay cleaner.

Cons:

Mogas with ethanol will corrode the float bowls if left setting for any length of time.

Fuel stabilizer must be used for extended non flying periods to prevent separation and protect metal components. (Over a month)

Note: It is best to drain the fuel system over winter and add aviation 100LL with stabilizer to prevent tank shrinking, breakdown of epoxy components, hardening of plastic components, and water based mold like growth which will grow in tanks.

Fuel left in the tank absorbs water, water causes corrosion, corrosion particles will flow through the carb from the bowls and wear the jets out faster.

The Piersburg fuel pumps (p/n 7.21440.78.0) are not completely immune to ethanol. Prolonged use of ethanol fuel can harden the plastic in our experience. At \$350 apiece, it is not a cheap fix, and since the pumps are located in or near the fuselage cockpit compartment a leak can be a disaster...

Cannot get mogas at most airports.

Fuel additives must be added with AvGas to suspend the lead.

Fuel system components affected by mogas with ethanol:

Fuel lines will carry smell through the lines since ethanol permeates rubber. Replace lines with a silicon lined fuel line R9 Rated or higher that meets EPA Permeation Specs. (All have a silicone type inner liner of blue, black or green of some sort. (This liner leaves the airplane free of that old gas smell which permeates rubber.)

Types commonly used Goodyear 30R9, Gates 27340 Barricade MPI Fuel Line Hose, Goodyear Flexshield 5412 SAE J1527 Marine Fuel Hose. The fuel inlet hose elbow and fuel bosses on the bottom of the tank should be modified. The fuel inlet hose can be replaced with an aluminum elbow. These are fairly inexpensive to manufacture and weld out of 2 inch aluminum tubing. To fit the bosses and the aluminum elbow, use marine hose and ProSeal to secure the short 2 inch hoses to seal the small amount of hose that will be directly in contact with the fuel. If properly installed, the aluminum will be in very close contact with the PTFE tank. The ProSeal will ooze over the rubber and seal it from permeation of the ethanol and fuel smell through the hose segments.

The use of ethanol in motor fuel is a common USA environmental problem. Those of you outside the US are less affected by the US EPA mandated ethanol use. If at all possible, look for non ethanol laced fuel if you can find it at a high enough octane rating suitable for your engine...

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