



# SPECIAL AIRWORTHINESS INFORMATION BULLETIN

Aircraft Certification Service  
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<http://www.faa.gov/aircraft/safety/alerts/>

*This is information only. Recommendations aren't mandatory.*

## Introduction

This Special Airworthiness Information Bulletin (SAIB) alerts you of an airworthiness concern where you could have **alcohol (ethanol or methanol) present in the automobile gasoline on any General Aviation airplane** type certificated (TC) to use automobile gasoline or with automobile gasoline supplemental type certificates (STCs).

## Background

Fuels have to conform to a specification in order to be approved for use in type-certificated aircraft. The American Society for Testing and Materials (ASTM) developed specifications for automobile gasoline as well as aviation gasoline. These specifications are ASTM D 910 and ASTM D 6227 for aviation gasoline and ASTM D 439 or ASTM D 4814 (latest revision) for automobile gasoline.

Automobile gasoline STCs were developed using fuel blended to ASTM specification D 439 or D 4814. The Environmental Protection Agency (EPA) regulations require the addition of oxygenates in some regions of the country, as do some local regulations. The most widely used oxygenates are alcohol (ethanol or methanol), Methyl Tertiary Butyl Ether (MTBE), and Ethyl Tertiary Butyl Ether (ETBE).

There is an increasing use of ethanol in automobile gasolines. The Energy Policy Act of 2005 replaces the 2 percent oxygen standard

with the Renewable Fuels Standard (RFS), which requires an ever-increasing amount of ethanol and biodiesel to be used across the country through 2012. Ethanol will continue to see increasing use in the United States.

There are two primary sources of automobile gasoline STCs for general aviation aircraft: the Experimental Aircraft Association (EAA) and Petersen Aviation. Neither the EAA STCs, nor Petersen Aviation STCs, allow the use of automobile gasoline containing alcohol (ethanol or methanol). Automobile gasolines containing MTBE or ETBE are acceptable.

Automobile gasoline containing alcohol is not allowed to be used in aircraft for the following reasons:

- The addition of alcohol to automobile gasoline adversely affects the volatility of the fuel, which could cause vapor lock.
- Alcohol present in automobile gasoline is corrosive and not compatible with the rubber seals and other materials used in aircraft, which could lead to fuel system deterioration and malfunction.
- Alcohol present in automobile gasoline is subject to phase separation, which happens when the fuel is cooled as a result of the aircraft's climbing to higher altitude. When the alcohol separates from the gasoline, it may carry water that has been held in solution and that cannot be handled by the sediment bowl.

- Alcohol present in automobile gasoline reduces the energy content of the fuel. Methanol has approximately 55 percent of the energy content of gasoline, and ethanol has approximately 73 percent of the energy content of automobile gasoline. The greater the amount of alcohol in the automobile gasoline, the greater the reduction in the aircraft's range.

## Recommendation

We recommend that you do the following about operating airplanes using automobile gasolines:

1. Use automobile gasoline that conforms to the specifications listed in the airplane flight manual or automobile gasoline STC flight manual supplement:
  - a. Verify the fuel has the proper octane rating
  - b. Verify the fuel has the allowable oxygenates:
    - i. Automobile gasolines containing MTBE or ETBE are acceptable.
    - ii. Automobile gasolines containing alcohol (methanol or ethanol) are not acceptable, unless specifically approved by the TC or STC.
2. If you are unsure about the presence of alcohol in your automobile gasoline, the following test can be performed:
  - a. Using a glass or chemical-resistant plastic (such as TPX) container, mark ten equally spaced volumes. A graduated cylinder is ideal; however, a non-tapered glass jar, such as a large (quart) olive bottle, will work.
  - b. Add one part water (approximately 100 ml) into the container, fill to the first mark, and then add nine parts (approximately 900 ml) of automobile gasoline, fill to the top mark. Shake thoroughly, let stand for 10 minutes or until automobile gasoline is again bright and clear. Record the apparent level of the line between the automobile gasoline and water.
3. If alcohol is present in the automobile gasoline, the water will absorb it, and the amount of water will appear to increase, indicating the automobile gasoline should not be used in the aircraft. However, if the water level remains the same, no alcohol is present in the automobile gasoline, and it can be used in the aircraft.
4. If you cannot obtain automobile gasoline that conforms to the specifications listed in the airplane flight manual or automobile gasoline STC flight manual supplement, use aviation gasoline conforming to ASTM specification D 910.

## For Further Information Contact

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