

Clearing the Air: How Unleaded Aviation Fuel Is Gaining Approval

Part 1: Understanding the STC process and why it matters to pilots and aircraft owners

By EAGLE

This is the first in a three-part series explaining how the next generation of unleaded aviation fuels may be authorized for use in specific engines and aircraft. This installment examines the Type Certificate (TC) and Supplemental Type Certificate (STC) processes, which enable eligible aircraft and engines to operate using qualified unleaded aviation gasoline (avgas) under the FAA's traditional certification procedures. The second part will review the Fleet Authorization process, developed through the Piston Aviation Fuels Initiative (PAFI), which allows eligible aircraft and engines to operate safely using unleaded avgas. The final installment will discuss the importance of industry consensus standards, such as those from ASTM International, in ensuring the safe, consistent production, distribution, and use of aviation fuels. For more information on these topics, visit: FlyEAGLE.org

Q: Why should pilots and aircraft owners be invested in the unleaded avgas approval process?

Pilots and aircraft owners play a critical role in the transition to unleaded fuels. Staying informed ensures they can adopt new fuels safely and efficiently while maintaining compliance with the required approvals or authorizations.

While the approval processes may seem technical, they directly affect daily operations, safety, maintenance, and long-term aircraft reliability. By understanding these impacts, owners can confidently navigate the transition and make informed decisions for their aircraft and missions.

Q: What is an STC, and how is it used to authorize unleaded aviation fuel for specific aircraft and engines?

A Supplemental Type Certificate (STC) is an FAA-issued approval that authorizes the use of specific fuel, fluids, parts, and/or equipment in a designated list of aircraft and engines. It is one of two pathways fuel developers can use to bring their products to market.

Through the STC process, fuel developers are solely responsible for testing the compatibility, safety, and performance of a new fuel with specific aircraft and engine models. Once the FAA reviews and approves the data, an STC is issued, authorizing the use of the fuel. The [STC database](#) can be searched to identify aircraft models approved for a specific modification or installation.

The applicant can sell the STC to customers, enabling them to modify their individual aircraft for the use of the fuel specified in the STC. This modification typically includes updating the fuel placard and may require additional adjustments depending on the STC. For aircraft with a standard airworthiness certificate, the alteration must be performed by a certificated mechanic or authorized entity in compliance with the STC.

STC data is considered proprietary to the applicant. Therefore, the FAA does not provide STC data directly to owners of aircraft with special, restricted, or experimental airworthiness certificates. However, the applicant may choose to share the necessary information with interested parties. Owners of Special Light Sport Aircraft (SLSA) can implement the authorization after the SLSA manufacturer issues approval. Experimental aircraft owners must individually determine appropriate unleaded fuels, either by conducting their own compatibility assessments or consulting the STC holder for relevant data.

Q: What is the Approved Model List (AML)?

The AML is a list of aircraft models approved for a specific modification or installation, typically under a Supplemental Type Certificate (STC). Aircraft owners must take specific actions to implement changes to their aircraft, typically through Service Bulletins or the installation of an STC. For aircraft with a standard airworthiness certificate, the alteration must be performed by a certificated mechanic or authorized entity in compliance with the TC/STC.

Q: How does the STC process differ from the FAA fleet authorization process?

Under the FAA's traditional STC/AML process, an applicant is responsible for demonstrating that the aircraft and engines meet all applicable regulations and minimum standards under the normal certification process when using the new unleaded fuel. The FAA reviews the compliance data provided by the applicant and, upon approval, issues an STC.

Under the Piston Aviation Fuels Initiative (PAFI), the FAA uses a combination of testing and analysis methods developed in collaboration with industry to determine if an unleaded avgas qualifies as a replacement for approved leaded avgas. The data obtained through testing supports the development of the ASTM production specification for the candidate fuel.

The FAA will identify the makes and models of type-certificated and non-type-certificated piston aircraft and engines that can safely operate with the qualified unleaded avgas, compiling them in the Eligible Fleet Authorization Summary Report (EFASR), which will also include experimental aircraft.

Additionally, the FAA will issue a Special Airworthiness Information Bulletin (SAIB) and provide detailed instructions to implement the necessary alterations for using the fuel. The candidate fuel is then qualified as a replacement fuel under the fleet authorization process for the eligible portion of the fleet.

Why is it important for pilots and aircraft owners to read and understand an unleaded fuel STC?

It's crucial for pilots and aircraft owners to read and fully understand an STC, as it outlines the specific modifications, limitations, and operational requirements necessary to safely

integrate the approved fuel or equipment into their aircraft. Strict adherence to the STC ensures compliance with FAA regulations while maintaining the safety, reliability, and airworthiness of the aircraft. Currently two fuels, G100UL from [General Aviation Modifications, Inc.](#) (GAMI) and [Swift Fuels'](#) 100R have approved AML-STCs.

By understanding both pathways, pilots and owners can better plan for the transition to unleaded fuels. Whether through individual STCs or fleet-wide approvals, these processes are designed to ensure safety and reliability.

Part 2 of this three-part series will delve into the FAA Fleet Authorization process and its benefits for the general aviation community.

Eliminate Aviation Gasoline Lead Emissions (EAGLE) is a comprehensive government-industry initiative consisting of the aviation and petroleum industries, the U.S. government stakeholders, and a wide range of other constituents and interested parties, all working toward the transition to lead-free aviation fuels for piston-engine aircraft by the end of 2030 (2032 for Alaska) without compromising the safety or economic health of the general aviation industry. To learn more, visit: <https://flyEAGLE.org>