U.S.Department
of Transportation
Federal Aviation Administration

Policy Statement

Subject: Enabling the Use of Unleaded Aviation Gasoline in Piston Engine Aircraft and Aircraft Engines through the Piston Aviation Fuels Initiative (PAFI) Fleet Authorization Process

Date: TBD

Initiated By: AIR-670

Policy No: PS-AIR-20-2000-DRAFT

Summary

This policy statement describes the Fleet Authorization process to allow eligible aircraft and aircraft engines to operate using qualified unleaded aviation gasoline (avgas) in a manner that ensures safety via the Piston Aviation Fuels Initiative (PAFI).

Current Statutory, Regulatory, and Advisory Material

This policy statement provides background information on the PAFI program and describes the Fleet Authorization process by which the Federal Aviation Administration (FAA) will authorize the use of unleaded avgas in aircraft and aircraft engines via the PAFI program. This policy statement is applicable to all piston-powered civil aircraft certificated under Title 14, Code of Federal Regulations (14 CFR) part 21 using the airworthiness standards found in 14 CFR parts 23, 25, 27, 29 and their predecessor regulations, aircraft certificated in the light-sport category under §21.190 (S-LSA), and to piston engines certificated under 14 CFR part 33. Information developed during this process may also be used to facilitate the use of unleaded avgas in piston powered experimental aircraft.

The use of unleaded avgas in aircraft has been addressed by Congress in section 565, *Aviation Fuel,* of the FAA Reauthorization Act of 2018, (Pub. L. 115-254). Section 565 includes language that requires the FAA to adopt a process, other than the traditional means of certification, to authorize the use of unleaded avgas in aircraft and aircraft engines. This policy statement defines that process. Section 565 also mandates that the process be adopted not later than 180 days after the completion of both the PAFI program and ASTM publication of a production specification for an unleaded avgas. The FAA has two methods to approve the use of a fuel in an aircraft or engine: the Fleet Authorization process developed to use the authority granted by Congress (FAA Reauthorization Act of 2018, Section 565(a)(3)) or through existing regulatory mechanisms by Type or Supplemental Type Certificate (Section 565(c)).

Background

Avgas is the only transportation fuel in the United States to contain lead as an additive. Tetra-Ethyl Lead (TEL) has been added to avgas since 1921 to boost octane ratings and prevent engine damage and knocking at higher power settings. Adding small amounts of the lead compound to gasoline has dramatic results on engine performance. Currently, 100 octane Low Lead (100LL) is the leaded avgas that remains the most commonly used and reliable fuel for piston-powered aircraft and the fuel upon which many aircraft piston engine designs are based.

The FAA is collaborating with industry to conduct research and development activities into the qualification of unleaded aviation fuels through the PAFI program. The PAFI program is a key part of the Eliminate Aviation Gasoline Lead Emissions (EAGLE[1]) initiative, with the goal to eliminate lead emissions from piston-engine aircraft by the end of 2030, without adversely impacting the safe and efficient operation of the existing fleet. EAGLE provides a framework to coordinate and align the wide range of research and development efforts, fuel testing and evaluation activities, and government actions needed for the transition to unleaded avgas. EAGLE will also address fuel production, and distribution concerns, in addition to identifying and addressing any gaps in efforts undertaken by government and industry to achieve the goals of the EAGLE initiative.

The PAFI program and the Fleet Authorization process defined in this policy statement work in tandem to support the EAGLE goal. Whereas PAFI provides for the evaluation, testing, and qualification of candidate unleaded fuels, the Fleet Authorization process will enable the broad use of qualified unleaded avgas in the U.S. fleet of piston engine aircraft. Such fuels may be authorized for use by a portion of the piston-powered U.S. aircraft fleet via the Fleet Authorization process.

The FAA also continues to support applicants seeking engine and airframe approvals that would allow the use of unleaded fuel formulations via the traditional Supplemental Type Certification (STC) process. The STC approval is limited to individual aircraft and engine types or for a broad range of applicable types of aircraft and engines by an approved model list (AML STC).

This policy statement does not provide guidance on obtaining an STC or amended TC for the use of unleaded fuel in an aircraft or aircraft engine.

Policy

Fuel Definition and Control

Fuel production, handling, and storage parameters are controlled by multiple industry-developed standards. These standards provide assurance of the quality of the fuel at delivery to the aircraft.

[1] EAGLE Initiative | Federal Aviation Administration (faa.gov)

To be eligible for Fleet Authorization via the PAFI program, ASTM must publish a production specification for the unleaded fuel as required by Section 565(b)(2). ASTM is a recognized standards development organization that will coordinate with the fuel producers to develop a consensus-based production specification to maintain the safety, quality, and reliability of the fuel.

The ASTM fuel production specification's provisions on composition limits and test methods applicable to the fuel's chemistry include properties and compositional criteria along with validated test methods that are necessary to ensure fuel quality control and compliance to the fuel standard throughout the supply chain.

Qualification of Replacement Fuels

The FAA will determine if a candidate unleaded avgas qualifies as a replacement for an approved leaded avgas under the PAFI program. PAFI relies on the support of key industry participants, such as aircraft and aircraft engine manufacturers, aviation fuel distributors and producers, and other stakeholders in the aviation fuel industry. The PAFI program is overseen by an independent, collaborative government/industry body of technical experts.

The FAA uses a combination of testing and analysis including the use of applicable, previously approved data provided by a design approval holder to determine if an unleaded avgas qualifies as a replacement for approved leaded avgas. Specifically, the candidate fuel will be tested to determine detonation, durability, performance and materials compatibility characteristics to understand the fuel's behavior throughout the range of aircraft and aircraft engine operating envelopes. After successful completion of PAFI testing and evaluation, the FAA considers the candidate fuel qualified as a replacement fuel.

Eligible Fleet Authorization Summary Report

Upon determination that a candidate fuel is qualified as a replacement fuel, the FAA Aircraft Certification Service (AIR) will review the aircraft (and their installed aircraft engines) listed in the FAA registry to determine their eligibility to operate using the qualified unleaded fuel in a manner that ensures safety. The FAA will consider type certificate data for aircraft and aircraft engines, test reports, and other data generated during the testing to determine which makes and models of aircraft and aircraft engines can safely operate with the qualified unleaded avgas. AIR will then use that information to develop an Eligible Fleet Authorization Summary Report. AIR will also evaluate the available data for the fuel's use in non-type certificated piston aircraft engines and piston powered experimental aircraft. Owners/operators of experimental aircraft may refer to the data and guidance provided to determine whether the fuel can be safely used with their installed aircraft engines.

Communication of Fleet Authorization

Along with the Eligible Fleet Authorization Summary Report, the FAA will issue a Special Airworthiness Information Bulletin (SAIB). The SAIB will identify the qualified fuel(s), specify the aircraft and engines eligible to use the qualified fuel(s), and provide references and other information necessary to enable the use of the fuel(s).

Alteration Process

The alteration process is the implementation mechanism for the Fleet Authorization process. The FAA expects the authorization process for most aircraft and aircraft engines will be implemented using the minor alteration process. Under the Fleet Authorization process, the use of a qualified unleaded avgas that does not appreciably affect weight, balance, structural strength, performance, powerplant operation, flight characteristics, or other qualities affecting aircraft airworthiness is a minor alteration. If the use of the qualified avgas has an appreciable effect on any of these characteristics, the alteration will be accomplished using the major alteration process.

Summary of the Fleet Authorization Process

The FAA will authorize the use of qualified unleaded avgas in aircraft and aircraft engines from the PAFI program under the Fleet Authorization process as set forth in this policy statement and described below:

1. When the candidate fuel has successfully completed PAFI testing and evaluation and the ASTM production specification has been published, the FAA-approved data will be documented in the Eligible Fleet Authorization Summary Report. The candidate fuel is then qualified as a replacement fuel.

2. FAA AIR will determine the makes and models of aircraft and aircraft engines that can safely operate with the qualified unleaded avgas. These makes and models of aircraft and aircraft engines and other information necessary to enable the use of the qualified fuel will also be specified in the Eligible Fleet Authorization Summary Report.

3. The FAA will then issue an SAIB to identify the qualified fuel, specify the aircraft and engines eligible to use the qualified fuel, and provide references and other information to accomplish the alteration necessary to enable the use of the fuel.

4. The person performing the alteration is responsible for verifying the eligibility of the aircraft and aircraft engine for use of the qualified fuel. That person will also be responsible for performing all required actions and completing all required documentation in accordance with the information referenced in the SAIB and applicable regulations. This includes installation of fuel placards, Aircraft Flight Manual Supplement revisions, and associated logbook entries for the aircraft and aircraft engine.

5. For aircraft with special airworthiness certificates in the light-sport category, the FAA has determined that alterations described in the SAIB meet the applicable and current consensus standard for the aircraft and are properly authorized. Accordingly, such alterations meet the requirement specified in 14 CFR §91.327(b)(5).

Effect of Policy

The general policy stated in this document does not constitute a new regulation. Agency employees, designees, and any person performing an action under a delegation of authority must not depart from this policy statement without appropriate justification and concurrence from the Aircraft Certification Service Policy and Innovation Division.

Victor Wicklund
Director (Acting), Policy and Innovation Division
Aircraft Certification Service

Attachment: Fleet Authorization Chart

FLEET AUTHORIZATION PROCESS

FUEL TESTING

FAA WJHTC

SEC. 565 (a)(1)

PAFI Testing and Evaluation

Test Reports

ASTM Specification Development

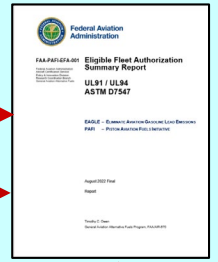
FUEL EVALUATION & APPROVAL

SEC. 565 (a)(2)

FAA Determination of Aircraft/ Engine Eligibility

ASTM Production Specification

SEC. 565 (b)(2)



Eligible Fleet Authorization Summary Report (Approved Data)

Installation procedures and information

FUEL AUTHORIZATION (OTHER THAN TRADITIONAL MEANS)

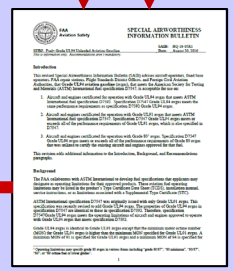
SEC. 565 (a)(3)

Implementation of Alteration for Each Aircraft / Engine

14 CFR Part 43

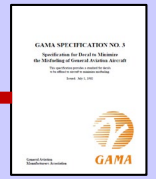
AVGAS ONLY

ASTM DXXXX UL100 | ASTM D7547 UL91 UL94 | ASTM D910 100VLL 100LL | ASTM D910 100



SAIB Communicates: (Qualified Fuel, aircraft & engines able to use the qualified fuel and information and references necessary to enable use of the qualified fuel)

SEC. 565 (b)(1)

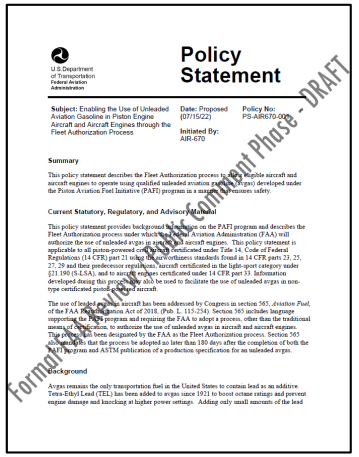


GAMA update to **Specification 3** for New Fuel Placards

Each Owner/Operator of an Eligible Aircraft/ Engine Configuration Processes Alteration to Add Fuel Spec to AFM Ops Limitations and Placard

PAFI SECTION 565 (a), (b) IMPLEMENTATION

ELIGIBLE FLEET AUTHORIZATION



Policy Statement to establish process per Section 565 (a)(3)