

FAA Unleaded Fuel Development FAQs and Definitions

What is EAGLE?

On February 23, 2022, the FAA announced EAGLE – Eliminate Aviation Gasoline Lead Emissions – a collaborative initiative with the general aviation (GA) community, fuel suppliers and distributors, airports, engine and aircraft manufacturers, research institutions, associations, and other federal agencies and key stakeholders. EAGLE partners are committed to ensuring the GA sector can safely transition to a lead-free future by the end of 2030, without affecting the safe and efficient operation of the piston-engine fleet. The effort was launched in direct response to a suite of converging issues that are prompting greater and more urgent multi-stakeholder collaboration to eliminate lead from aviation gasoline (avgas) as well as in response to recommendations in the National Academies of Sciences, Engineering, and Medicine (NASEM) January 2021 report mandated by Congress in the 2018 FAA Reauthorization Act.

The EAGLE framework encompasses four pillars of action designed to foster the necessary evaluation, authorization, regulatory, innovation, and infrastructure solution sets to enable the commercial viability of unleaded aviation gasoline needed to facilitate the transition. The initiative supports the Administration’s sustainable transportation and broader environmental priorities and is part of the FAA’s ongoing effort to build a sustainable aviation system.

What is PAFI?

The Piston Engine Aviation Fuels Initiative (PAFI) was established in 2014 to support the evaluation of candidate-unleaded fuels to replace approved leaded gasoline, with the objective of ultimately qualifying a fleet-wide solution. Once a candidate fuel formulation is qualified for PAFI testing, the FAA tests it using methods created through collaboration with industry. The collaborative process also includes the selection of materials, engines, and aircraft to test to ensure the full general aviation engine power range and aircraft operational spectrum are represented. Company test data within PAFI are considered proprietary. The data collected contribute to FAA’s fleet eligibility determination.

Although no high-octane unleaded replacement fuel has yet been qualified under PAFI as a suitable drop-in candidate, approval of a qualified fuel would occur following the issuance of a new production specification/standard of safety and reliability.

There are different approval pathways for the FAA to authorize the use of new unleaded (fuels). How do the Piston Aviation Fuels Initiative (PAFI), Fleet Authorization process, and Supplemental Type Certificate process differ?

PAFI/Fuel Authorization

The FAA is committed to safely reducing and ultimately eliminating the use of leaded aviation gasoline without adversely affecting the safe and efficient operation of the existing piston engine fleet. The Piston Engine Aviation Fuels Initiative (PAFI) and the FAA’s fleet authorization process work in tandem to help support this goal. Whereas PAFI provides for the evaluation, testing, and qualification of candidate unleaded replacement fuel(s), the FAA’s fleet authorization process,

outlined under section 565 of the FAA Reauthorization Act of 2018, provides for the broad application of the qualified fuel(s) to the U.S. fleet of piston engine GA aircraft. The Act allows the use of an unleaded aviation gasoline if the Administrator “adopts a process (other than the traditional means of certification) to allow eligible aircraft and engines to operate using qualified replacement unleaded gasoline in a manner that ensures safety.”

Supplemental Type Certificate

The Supplemental Type Certificate (STC) process follows the traditional certification path for modifying an aeronautical product from its original design. It involves a focused review by the fuel developer and the FAA that incorporates by reference the related type certificate (TC) and considers not only the proposed modification but also how that modification affects the original design.

The FAA STC approval indicates the specific engine and aircraft model(s) meet the minimum certification requirements when operating with the new unleaded fuel. Fuel use is limited to individual aircraft and engine types or by an approved model list (AML STC). Additional aircraft and engine models can be added to the approved model list without amending the STC. The STC does not substantiate the fuel’s producibility, supply chain infrastructure compatibility, quality control, or environmental compliance.

Does the FAA certify fuels?

The FAA does not certify fuels. The FAA certifies aircraft and engines to operate on specific fuels as part of the STC process.

Does the FAA approval indemnify all fuel-related liabilities?

No, FAA approval of a fuel does not indemnify a fuel developer for fuel-related liabilities.

Why is a fuel specification such as an ASTM specification needed?

Unlike all other aspects of aircraft design, the FAA does not regulate the production, distribution, handling, operation, and maintenance of aviation fuel before it reaches the aircraft fuel tanks. Quality control of the fuel composition is an important aspect of a fuel specification. The composition of hydrocarbon fuels varies with each batch produced, and a scientifically developed and statistically based regime of fuel property tests is required to maintain the fuel composition within known variance to ensure each production batch of aviation fuel is fit for purpose for use on aircraft. Historically, fuel producers have used consensus-based industry standard, such as one developed by ASTM International, as their means to achieve these goals. A consensus-based industry standard is the product of a collaborative approach that includes many stakeholders from the aviation fuel community as well as other experts.

Definitions:

Drop-In Fuel

A “drop-in” fuel does not affect the airworthiness and performance of the existing fleet of aircraft and engines and typically does not require new aviation fuel-related operating limitations. An extensive qualification test program that encompasses both fuel property evaluation and engine and aircraft testing would be required to determine if a new fuel is a drop-in.

Transparent Fleet

The segment of the existing fleet of engines and aircraft for which a new fuel is a drop-in is called the “transparent fleet.” Changes such as new or modified hardware, adjustments, or new operating procedures/limitations are not required for the aircraft and engines in the transparent fleet, but FAA approval may be required to enable operation under the existing operating limitations.

Non-Transparent Fleet

The segment of the existing fleet of engines and aircraft for which a new fuel is not a drop-in is called the “non-transparent fleet.” FAA approval of new operating limitations and changes such as new or modified hardware, adjustments, or new operating procedures/limitations will be required for aircraft and engines in the non-transparent fleet.

OEM Service Bulletin

Original Equipment Manufacturer (OEM) Service Bulletins are a communication vehicle utilized by engine and aircraft type certificate (TC) holders to advise owner/operators of approved aviation fuels. New aviation fuels added to a TC are approved under traditional certification procedures and airworthiness standards, after which the OEM service bulletin is updated with the newly added fuel.

Special Airworthiness Information Bulletin (SAIB)

A Special Airworthiness Information Bulletin is an information tool that alerts, educates, and makes recommendations from the FAA to the aviation community. SAIBs contain non-regulatory information and guidance that are not mandatory, and do not meet the criteria for a mandatory FAA Airworthiness Directive (AD).

AIRPORTS

What can airports do in the short-term to reduce or minimize potential exposure to aircraft lead emissions?

In the short term, there are some measures that airport owners/operators can implement at airports to reduce or minimize potential exposure to aircraft lead emissions.

- Where possible, increase the distance between run-up areas and public areas on and off airport to reduce potential exposures to aircraft lead emissions by shifting run-up areas, shifting fences, and/or posting signs to discourage loitering in areas where there may be potential and unnecessary exposure to lead from aircraft emissions.
- Encourage engine run-ups/maintenance runs in locations that minimize exposure of engine exhaust streams to areas of public congregation on and off airport.
- Pilots can minimize idle time (e.g., call for IFR clearance before starting the engine(s) and minimize engine run-up time.
- Promote airport and pilot awareness – airport owners/operators are encouraged to work with piston-engine aircraft operators to inform and promote implementation of these measures.
- Offer unleaded fuel alternatives (e.g. UL94) for compatible/authorized piston-engine aircraft.

What authorities does the FAA have to ensure airports continue serving/offering leaded avgas? Under what circumstances can airports decide to unilaterally stop selling leaded avgas?

The FAA ensures that airports continue offering avgas through Grant Assurance 22, *Economic Nondiscrimination*. A ban or restriction on the sale or use of 100LL avgas at a federally obligated airport is inconsistent with Grant Assurance 22, *Economic Nondiscrimination* (49 USC 47107(a)(1)) and conflicts with the self-service provision. Any restriction on the sale or dispensing of any type of fuel, when there is demand/need or a fuel provider willing to provide the fuel, must be approved in advance by the FAA. Any such proposed restriction must be supported by a valid, FAA approved justification. Such justification cannot be unreasonable or unjustly discriminatory.