

Federal Aviation Agency

ADVISORY CIRCULAR

AC NO: AC 20-24A

AIRCRAFT

EFFECTIVE :

4/14/67

SUBJECT : QUALIFICATION OF FUELS, LUBRICANTS, AND ADDITIVES

1. **PURPOSE.** This circular describes procedures that may be used for approving the subject materials for use in certificated aircraft.
2. **CANCELLATION.** AC No. 20-24, effective June 16, 1964, is canceled.
3. **BACKGROUND.** In certificating an engine, the Administrator has responsibility under Federal Aviation Regulations, Part 33, for establishing the limitations for its operation on the basis of the engine-operating conditions demonstrated during the block tests. Such operating limitations include those items relating to power, speeds, temperatures, pressures, fuels, and lubricants which he finds necessary for safe operation of the engine. The limitations on fuels and lubricants include the additives that may be blended with the fuel or lubricant. The suitability and durability of all materials used in the engine are established on the basis of experience or tests, and all materials used in the engine must conform to approved specifications. Experience and test data should be on engine models which are at least similar in configuration, materials, operating characteristics, and power category to those of the engine in which these materials are intended to be used.
4. **DISCUSSION.** Fuels and lubricants found to perform satisfactorily during the type certification program of an engine are approved as part of the type design under the type certificate and are listed on the pertinent engine TC data sheet. Fuels or lubricants that are not in conformance with the type certificate holder's approved specification listed on the engine data sheet, or a specification approved under a supplemental type certificate, are not eligible for use in a certificated engine. When an unapproved additive is to be used in an approved fuel or oil, the combination should be considered a new material, as physical and chemical properties of the fuel or oil may have been altered significantly. Further, such materials are not eligible to be used in a certificated aircraft until compatibility of these materials has been established with the aircraft components with which they come in contact.

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4/14/67

5. **PROCEDURE.** The Chief, Engineering and Manufacturing Branch, for the region in which the applicant is located may approve as a supplemental type certificate or as an amendment to an existing type certificate the use of fuels, lubricants, and additives for use in designated engine(s) upon receipt of suitable data demonstrating conformance with the applicable portions of FAR, Part 33. These data should be obtained during an FAA approved and witnessed test program and should include the following:

- a. Preliminary Data - Prior to FAA authorization for test, a report should be submitted to substantiate that the fuel, lubricant, or additive combinations have undergone sufficient test and development to show that, under the conditions in which they will be used in aircraft, they are compatible with the applicable engine and aircraft materials. The compatibility data should include compatibility with fuels, lubricants, and additives that are approved for the engine and aircraft.
- b. Test - A description of the test program and equipment that the applicant proposes to use in demonstrating the airworthiness of the material to be approved should be submitted with the application for approval. The satisfactory completion of the applicable test requirements of Sections 33.41 and 33.81, or the equivalent, is the minimum test requirement for approval. A 500-hour controlled flight test, under the following test conditions, may be considered as an equivalent for the requirements of Section 33.41 or Section 33.81, when followed by a complete teardown inspection:

Takeoff power or thrust	5 Hours Minimum
Max. continuous power or thrust	20 " "
Cruise power or thrust	450 " "
Idle	25 " "

- c. Final Data - At the completion of aircraft engine tests, a report including at least the following should be submitted:
 - (1) Description of the engine in which the material was tested.
 - (2) Chronological history of test conditions and engine performance, including r.p.m., power or thrust levels achieved during the test, fuel and oil consumption, oil changes, parts replacements, and other pertinent test results.
 - (3) An analysis of lubricating oil samples taken before and after the test and before each oil change.

4/16/67

- (4) Evidence that abnormal wear, deposits, metal attack, or other harmful effects did not occur as the result of the material under test.
- d. Identification - The material tested must be covered by a specification that is written in sufficient detail to provide at least the physical properties and limits by which uniform quality and composition can be maintained. If the material is to be used in a blend with another material, instructions for blending should be provided.
- e. Concentration - The materials tested should be approved for use only in the concentrations "up to the maximum" at which they were qualified by test.


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