



U.S. Department  
of Transportation  
**Federal Aviation  
Administration**

# Policy Statement

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**Subject:** Clarification for 14 CFR Part  
33.83 Vibration Test

**Date:** 11/03/2015

**Policy No:**  
PS-ANE-33.83-01

**Initiated By:**  
ANE-111

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## 1. Summary

This policy clarifies that the required vibration surveys and engine surveys of § 33.83(a) are intended to be implemented by engine test. It further clarifies that the required “appropriate combination of experience, analysis, and component test” is intended to be implemented in support of conducting the engine test.

## 2. Current Regulatory and Advisory Material

Section 33.83 is the regulation applicable to the engine vibration survey. It prescribes the preparation work required to perform the engine vibration survey, the test engine configuration and test conditions, the test results pass-fail criteria, and the requirements for fault conditions. Advisory Circular AC33.83A provides acceptable means of compliance with the engine vibration survey requirements of § 33.83. Advisory Circulars AC33.83-1 and AC33-8 provide comparative test and analysis methods that may be used for turbine engine or auxiliary power unit (APU) parts produced under part manufacturer approval (PMA).

The airworthiness standards in § 33.83 refer to “engine surveys,” “vibration surveys,” “vibration test,” or simply “surveys” with the intent to prescribe engine vibration surveys conducted by engine test. We have applied this intent since the inception of the rule in 1952, and it is common certification practice in the industry. The preamble language in subsequent rule amendments also supports the intent of using an engine test.

## 3. Relevant Past Practice

a. The regulatory intent for an engine test to perform engine vibration surveys has remained the same since the Civil Aviation Regulations (CARs). CAR part 13 section 13.251 Vibration test required that a vibration survey be conducted to investigate the vibration characteristics of the engine. In 1964, the same requirements were assigned to 33.83 Vibration test as part of the FAA recodification of the airworthiness standards. In 1974, the regulation was revised as part of broad change to the airworthiness standards applicable to aircraft and aircraft

engine certifications. The vibration survey requirement was consistently interpreted and applied by running an engine vibration test for each type certificated engine design.

**b.** In 1996, amendment 33-17 introduced changes to the rule to harmonize the U.S. regulations with existing and proposed regulations of the European Joint Aviation Authorities (JAA). In regard to § 33.83 Vibration test, the NPRM preamble states that the proposed changes are to (1) expand the scope of vibration tests, and (2) clarify vibration test requirements. It further states that the proposal “retains the current practice of the FAA and JAA of limiting formal certification test requirements to only the final engine or major assembly rig vibration test.”

**c.** The specific changes introduced by amendment 33-17 clarified which engine components should be subjected to the vibration survey. The preamble to NPRM states that the changes are made to “clarify the existing requirement that all components in each engine that may be subject to mechanically or aerodynamically induced vibratory excitations must undergo vibration surveys” and that “substantive precertification activity (tests and analyses) is necessary for determining which engine components require verification by the engine certification process.”

**d.** The precertification activity discussed in the preamble was added as the requirement that “the engine surveys shall be based upon an appropriate combination of experience, analysis, and component test and shall address, as a minimum, blades, vanes, rotor discs, spacers, and rotor shafts”. This requirement has been included in the development of the engine test plan, such as to establish which engine components require verification by engine test, and to determine the proper location for engine test instrumentation. Relevant past practices show that this activity includes substantive tests and analyses for determining component (or system) natural frequencies, mode shapes, steady state mean stress, and vibratory stress distributions. The precertification test activity is also discussed in AC33.83, issued together with amendment 33-17 final rule.

**e.** We determined that amendment 33-17 change inadvertently introduced confusion as to whether an “appropriate combination of experience, analysis, and component test” is acceptable in lieu of an engine test. Misunderstanding the requirements leads to unnecessary burden and cost for applicants. Clarifying the requirements of § 33.83 will ensure applicants do not incur unnecessary costs to comply with this rule.

#### **4. Policy**

**a. Vibration surveys.** The requirement of § 33.83(a) that states, “Each engine must undergo vibration surveys” is intended to be implemented by engine test.

**b. Conduct of the engine test.** The requirements of § 33.83(a) stating that “The engine surveys shall be based upon an appropriate combination of experience, analysis, and component test and shall address, as a minimum, blades, vanes, rotor discs, spacers, and rotor shafts,” is intended to be applied to activities supporting the conduct of the engine vibration test.

c. The acceptable means of compliance are prescribed by AC33.83A and AC33.83-1, and do not change as a result of this policy. In addition, this policy does not invalidate the FAA accepted practices for compliance based on similarity to a FAA approved baseline engine test.

## **5. Effect of Policy**

The general policy stated in this document does not constitute a new regulation or create what the courts refer to as a “binding norm.” The office that implements policy should follow this policy when applicable to the specific project. Whenever a type approval holder's proposed method of compliance is outside this established policy, it must be coordinated with the policy issuing office. Similarly, if the implementing office becomes aware of reasons that a type approval holder's proposal that meets this policy should not be approved, the office must coordinate its response with the policy issuing office.

/s/

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