

minute OEI ratings are desired, may be subjected to the endurance testing of §§33.87 (b), (c), (d), or (e) of this part, and followed by the testing of §33.87(f) without intervening disassembly and inspection. However, the engine must comply with paragraph (a) of this section after completing the endurance testing of §33.87(f).

[Doc. No. 26019, 61 FR 31329, June 19, 1996, as amended by Amdt. No. 33-25, 73 FR 48124, Aug. 18, 2008]

§ 33.94 Blade containment and rotor unbalance tests.

(a) Except as provided in paragraph (b) of this section, it must be demonstrated by engine tests that the engine is capable of containing damage without catching fire and without failure of its mounting attachments when operated for at least 15 seconds, unless the resulting engine damage induces a self shutdown, after each of the following events:

(1) Failure of the most critical compressor or fan blade while operating at maximum permissible r.p.m. The blade failure must occur at the outermost retention groove or, for integrally-bladed rotor discs, at least 80 percent of the blade must fail.

(2) Failure of the most critical turbine blade while operating at maximum permissible r.p.m. The blade failure must occur at the outermost retention groove or, for integrally-bladed rotor discs, at least 80 percent of the blade must fail. The most critical turbine blade must be determined by considering turbine blade weight and the strength of the adjacent turbine case at case temperatures and pressures associated with operation at maximum permissible r.p.m.

(b) Analysis based on rig testing, component testing, or service experience may be substitute for one of the engine tests prescribed in paragraphs (a)(1) and (a)(2) of this section if—

(1) That test, of the two prescribed, produces the least rotor unbalance; and

(2) The analysis is shown to be equivalent to the test.

Secs. 313(a), 601, and 603, Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, and 1423); and 49 U.S.C. 106(g) Revised, Pub. L. 97-449, Jan. 12, 1983)

[Amdt. 33-10, 49 FR 6854, Feb. 23, 1984]

§ 33.95 Engine-propeller systems tests.

If the engine is designed to operate with a propeller, the following tests must be made with a representative propeller installed by either including the tests in the endurance run or otherwise performing them in a manner acceptable to the Administrator:

(a) Feathering operation: 25 cycles.

(b) Negative torque and thrust system operation: 25 cycles from rated maximum continuous power.

(c) Automatic decoupler operation: 25 cycles from rated maximum continuous power (if repeated decoupling and recoupling in service is the intended function of the device).

(d) Reverse thrust operation: 175 cycles from the flight-idle position to full reverse and 25 cycles at rated maximum continuous power from full forward to full reverse thrust. At the end of each cycle the propeller must be operated in reverse pitch for a period of 30 seconds at the maximum rotational speed and power specified by the applicant for reverse pitch operation.

[Doc. No. 3025, 29 FR 7453, June 10, 1964, as amended by Amdt. 33-3, 32 FR 3737, Mar. 4, 1967]

§ 33.96 Engine tests in auxiliary power unit (APU) mode.

If the engine is designed with a propeller brake which will allow the propeller to be brought to a stop while the gas generator portion of the engine remains in operation, and remain stopped during operation of the engine as an auxiliary power unit ("APU mode"), in addition to the requirements of §33.87, the applicant must conduct the following tests:

(a) Ground locking: A total of 45 hours with the propeller brake engaged in a manner which clearly demonstrates its ability to function without adverse effects on the complete engine while the engine is operating in the APU mode under the maximum conditions of engine speed, torque, temperature, air bleed, and power extraction as specified by the applicant.

(b) Dynamic braking: A total of 400 application-release cycles of brake engagements must be made in a manner which clearly demonstrates its ability to function without adverse effects on