Federal Aviation Administration, DOT

§ 33.7 Engine ratings and operating limitations.

(a) Engine ratings and operating limitations are established by the Administrator and included in the engine certificate data sheet specified in §21.41 of this chapter, including ratings and limitations based on the operating conditions and information specified in this section, as applicable, and any other information found necessary for safe operation of the engine.

(b) For reciprocating engines, ratings and operating limitations are established relating to the following:

(1) Horsepower or torque, r.p.m., manifold pressure, and time at critical pressure altitude and sea level pressure altitude for—

(i) Rated maximum continuous power (relating to unsupercharged operation or to operation in each supercharger mode as applicable); and

(ii) Rated takeoff power (relating to unsupercharged operation or to operation in each supercharger mode as applicable). 

(2) Fuel grade or specification.

(3) Oil grade or specification.

(4) Temperature of the—

(i) Cylinder;

(ii) Oil at the oil inlet; and

(iii) Turbosupercharger turbine wheel inlet gas.

(5) Pressure of—

(i) Fuel at the fuel inlet; and

(ii) Oil at the main oil gallery.

(6) Accessory drive torque and overhang moment.

(7) Component life.

(c) Safety analysis assumptions. The assumptions of the safety analysis as described in §33.75(d) with respect to the reliability of safety devices, instrumentation, early warning devices, maintenance checks, and similar equipment or procedures that are outside the control of the engine manufacturer.

§ 33.8

(c) For turbine engines, ratings and operating limitations are established relating to the following:

(1) Horsepower, torque, or thrust, r.p.m., gas temperature, and time for—
   (i) Rated maximum continuous power or thrust (augmented);
   (ii) Rated maximum continuous power or thrust (unaugmented);
   (iii) Rated takeoff power or thrust (augmented);
   (iv) Rated takeoff power or thrust (unaugmented);
   (v) Rated 30-minute OEI power;
   (vi) Rated 2½-minute OEI power;
   (vii) Rated continuous OEI power; and
   (viii) Rated 2-minute OEI Power;
   (ix) Rated 30-second OEI power; and
   (x) Auxiliary power unit (APU) mode of operation.

(2) Fuel designation or specification.

(3) Oil grade or specification.

(4) Hydraulic fluid specification.

(5) Temperature of—
   (i) Oil at a location specified by the applicant;
   (ii) Induction air at the inlet face of a supersonic engine, including steady state operation and transient over-temperature and time allowed;
   (iii) Hydraulic fluid of a supersonic engine;
   (iv) Fuel at a location specified by the applicant; and
   (v) External surfaces of the engine, if specified by the applicant.

(6) Pressure of—
   (i) Fuel at the fuel inlet;
   (ii) Oil at a location specified by the applicant;
   (iii) Induction air at the inlet face of a supersonic engine, including steady state operation and transient over-pressure and time allowed; and
   (iv) Hydraulic fluid.

(7) Accessory drive torque and overhang moment.

(8) Component life.

(9) Fuel filtration.

(10) Oil filtration.

(11) Bleed air.

(12) The number of start-stop stress cycles approved for each rotor disc and spacer.

(13) Inlet air distortion at the engine inlet.

(14) Transient rotor shaft overspeed r.p.m., and number of overspeed occurrences.

(15) Transient gas overtemperature, and number of overtemperature occurrences.

(16) Transient engine overtorque, and number of overtorque occurrences.

(17) Maximum engine overtorque for turbopropeller and turboshift engines incorporating free power turbines.

(18) For engines to be used in supersonic aircraft, engine rotor windmilling rotational r.p.m.

(d) In determining the engine performance and operating limitations, the overall limits of accuracy of the engine control system and of the necessary instrumentation as defined in §33.5(a)(6) must be taken into account.


§ 33.8 Selection of engine power and thrust ratings.

(a) Requested engine power and thrust ratings must be selected by the applicant.

(b) Each selected rating must be for the lowest power or thrust that all engines of the same type may be expected to produce under the conditions used to determine that rating.

[Amdt. 33–3, 32 FR 3736, Mar. 4, 1967]

Subpart B—Design and Construction; General

§ 33.11 Applicability.

This subpart prescribes the general design and construction requirements for reciprocating and turbine aircraft engines.

§ 33.13 [Reserved]

§ 33.15 Materials.

The suitability and durability of materials used in the engine must—

(a) Be established on the basis of experience or tests; and

(b) Conform to approved specifications (such as industry or military specifications) that ensure their having

846