

(i) K25.1.4(a), fuel system pressure and flow requirements;

(ii) K25.1.4(a)(3), low fuel alerting; and

(iii) K25.1.4(c), engine oil tank design.

(2) For ETOPS type design approval of an airplane beyond 180 minutes an applicant must comply with § 25.1535.

(c) *Airplanes with more than two engines.* An applicant for ETOPS type design approval must comply with § 25.1535 for an airplane manufactured on or after February 17, 2015, except that, for an airplane configured for a three person flight crew, the applicant need not comply with Appendix K, K25.1.4(a)(3), of this part, low fuel alerting.

[Doc. No. FAA-2002-6717, 72 FR 1873, Jan. 16, 2007]

§ 25.5 Incorporations by reference.

(a) The materials listed in this section are incorporated by reference in the corresponding sections noted. These incorporations by reference were approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. These materials are incorporated as they exist on the date of the approval, and notice of any change in these materials will be published in the FEDERAL REGISTER. The materials are available for purchase at the corresponding addresses noted below, and all are available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202-741-6030, or go to: <http://www.archives.gov/federal-register/cfr/ibr-locations.html>.

(b) The following materials are available for purchase from the following address: The National Technical Information Services (NTIS), Springfield, Virginia 22166.

(1) Fuel Tank Flammability Assessment Method User's Manual, dated May 2008, document number DOT/FAA/AR-05/8, IBR approved for § 25.981 and Appendix N. It can also be obtained at the following Web site: <http://www.fire.tc.faa.gov/systems/fuel-tank/FTFAM.stm>.

(2) [Reserved]

[73 FR 42494, July 21, 2008, as amended by Doc. No. FAA-2018-0119, Amdt. 21-101, 83 FR 9169, Mar. 5, 2018]

Subpart B—Flight

GENERAL

§ 25.21 Proof of compliance.

(a) Each requirement of this subpart must be met at each appropriate combination of weight and center of gravity within the range of loading conditions for which certification is requested. This must be shown—

(1) By tests upon an airplane of the type for which certification is requested, or by calculations based on, and equal in accuracy to, the results of testing; and

(2) By systematic investigation of each probable combination of weight and center of gravity, if compliance cannot be reasonably inferred from combinations investigated.

(b) [Reserved]

(c) The controllability, stability, trim, and stalling characteristics of the airplane must be shown for each altitude up to the maximum expected in operation.

(d) Parameters critical for the test being conducted, such as weight, loading (center of gravity and inertia), airspeed, power, and wind, must be maintained within acceptable tolerances of the critical values during flight testing.

(e) If compliance with the flight characteristics requirements is dependent upon a stability augmentation system or upon any other automatic or power-operated system, compliance must be shown with §§ 25.671 and 25.672.

(f) In meeting the requirements of §§ 25.105(d), 25.125, 25.233, and 25.237, the wind velocity must be measured at a height of 10 meters above the surface, or corrected for the difference between the height at which the wind velocity is measured and the 10-meter height.

(g) The requirements of this subpart associated with icing conditions apply only if the applicant is seeking certification for flight in icing conditions.

(1) Paragraphs (g)(3) and (4) of this section apply only to airplanes with one or both of the following attributes:

(i) Maximum takeoff gross weight is less than 60,000 lbs; or

(ii) The airplane is equipped with reversible flight controls.

§ 25.23

(2) Each requirement of this subpart, except §§ 25.121(a), 25.123(c), 25.143(b)(1) and (2), 25.149, 25.201(c)(2), 25.239, and 25.251(b) through (e), must be met in the icing conditions specified in Appendix C of this part. Section 25.207(c) and (d) must be met in the landing configuration in the icing conditions specified in Appendix C, but need not be met for other configurations. Compliance must be shown using the ice accretions defined in part II of Appendix C of this part, assuming normal operation of the airplane and its ice protection system in accordance with the operating limitations and operating procedures established by the applicant and provided in the airplane flight manual.

(3) If the applicant does not seek certification for flight in all icing conditions defined in Appendix O of this part, each requirement of this subpart, except §§ 25.105, 25.107, 25.109, 25.111, 25.113, 25.115, 25.121, 25.123, 25.143(b)(1), (b)(2), and (c)(1), 25.149, 25.201(c)(2), 25.207(c), (d), and (e)(1), 25.239, and 25.251(b) through (e), must be met in the Appendix O icing conditions for which certification is not sought in order to allow a safe exit from those conditions. Compliance must be shown using the ice accretions defined in part II, paragraphs (b) and (d) of Appendix O, assuming normal operation of the airplane and its ice protection system in accordance with the operating limitations and operating procedures established by the applicant and provided in the airplane flight manual.

(4) If the applicant seeks certification for flight in any portion of the icing conditions of Appendix O of this part, each requirement of this subpart, except §§ 25.121(a), 25.123(c), 25.143(b)(1) and (2), 25.149, 25.201(c)(2), 25.239, and 25.251(b) through (e), must be met in the Appendix O icing conditions for which certification is sought. Section 25.207(c) and (d) must be met in the landing configuration in the Appendix O icing conditions for which certification is sought, but need not be met for other configurations. Compliance must be shown using the ice accretions defined in part II, paragraphs (c) and (d) of Appendix O, assuming normal operation of the airplane and its ice protection system in accordance with the operating limitations and operating

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procedures established by the applicant and provided in the airplane flight manual.

[Doc. No. 5066, 29 FR 18291, Dec. 24, 1964, as amended by Amdt. 25–23, 35 FR 5671, Apr. 8, 1970; Amdt. 25–42, 43 FR 2320, Jan. 16, 1978; Amdt. 25–72, 55 FR 29774, July 20, 1990; Amdt. 25–121, 72 FR 44665, Aug. 8, 2007 Amdt. 25–135, 76 FR 74654, Dec. 1, 2011; Amdt. 25–140, 79 FR 65524, Nov. 4, 2014]

§ 25.23 Load distribution limits.

(a) Ranges of weights and centers of gravity within which the airplane may be safely operated must be established. If a weight and center of gravity combination is allowable only within certain load distribution limits (such as spanwise) that could be inadvertently exceeded, these limits and the corresponding weight and center of gravity combinations must be established.

(b) The load distribution limits may not exceed—

(1) The selected limits;

(2) The limits at which the structure is proven; or

(3) The limits at which compliance with each applicable flight requirement of this subpart is shown.

§ 25.25 Weight limits.

(a) *Maximum weights.* Maximum weights corresponding to the airplane operating conditions (such as ramp, ground or water taxi, takeoff, en route, and landing), environmental conditions (such as altitude and temperature), and loading conditions (such as zero fuel weight, center of gravity position and weight distribution) must be established so that they are not more than—

(1) The highest weight selected by the applicant for the particular conditions; or

(2) The highest weight at which compliance with each applicable structural loading and flight requirement is shown, except that for airplanes equipped with standby power rocket engines the maximum weight must not be more than the highest weight established in accordance with appendix E of this part; or

(3) The highest weight at which compliance is shown with the certification requirements of Part 36 of this chapter.

(b) *Minimum weight.* The minimum weight (the lowest weight at which

compliance with each applicable requirement of this part is shown) must be established so that it is not less than—

- (1) The lowest weight selected by the applicant;
- (2) The design minimum weight (the lowest weight at which compliance with each structural loading condition of this part is shown); or
- (3) The lowest weight at which compliance with each applicable flight requirement is shown.

[Doc. No. 5066, 29 FR 18291, Dec. 24, 1964, as amended by Amdt. 25-23, 35 FR 5671, Apr. 8, 1970; Amdt. 25-63, 53 FR 16365, May 6, 1988]

§ 25.27 Center of gravity limits.

The extreme forward and the extreme aft center of gravity limitations must be established for each practicably separable operating condition. No such limit may lie beyond—

- (a) The extremes selected by the applicant;
- (b) The extremes within which the structure is proven; or
- (c) The extremes within which compliance with each applicable flight requirement is shown.

§ 25.29 Empty weight and corresponding center of gravity.

(a) The empty weight and corresponding center of gravity must be determined by weighing the airplane with—

- (1) Fixed ballast;
- (2) Unusable fuel determined under § 25.959; and
- (3) Full operating fluids, including—
 - (i) Oil;
 - (ii) Hydraulic fluid; and
 - (iii) Other fluids required for normal operation of airplane systems, except potable water, lavatory precharge water, and fluids intended for injection in the engine.

(b) The condition of the airplane at the time of determining empty weight must be one that is well defined and can be easily repeated.

[Doc. No. 5066, 29 FR 18291, Dec. 24, 1964, as amended by Amdt. 25-42, 43 FR 2320, Jan. 16, 1978; Amdt. 25-72, 55 FR 29774, July 20, 1990]

§ 25.31 Removable ballast.

Removable ballast may be used on showing compliance with the flight requirements of this subpart.

§ 25.33 Propeller speed and pitch limits.

(a) The propeller speed and pitch must be limited to values that will ensure—

- (1) Safe operation under normal operating conditions; and
 - (2) Compliance with the performance requirements of §§ 25.101 through 25.125.
- (b) There must be a propeller speed limiting means at the governor. It must limit the maximum possible governed engine speed to a value not exceeding the maximum allowable r.p.m.

(c) The means used to limit the low pitch position of the propeller blades must be set so that the engine does not exceed 103 percent of the maximum allowable engine rpm or 99 percent of an approved maximum overspeed, whichever is greater, with—

- (1) The propeller blades at the low pitch limit and governor inoperative;
- (2) The airplane stationary under standard atmospheric conditions with no wind; and
- (3) The engines operating at the take-off manifold pressure limit for reciprocating engine powered airplanes or the maximum takeoff torque limit for turbopropeller engine-powered airplanes.

[Doc. No. 5066, 29 FR 18291, Dec. 24, 1964, as amended by Amdt. 25-57, 49 FR 6848, Feb. 23, 1984; Amdt. 25-72, 55 FR 29774, July 20, 1990]

PERFORMANCE

§ 25.101 General.

(a) Unless otherwise prescribed, airplanes must meet the applicable performance requirements of this subpart for ambient atmospheric conditions and still air.

(b) The performance, as affected by engine power or thrust, must be based on the following relative humidities;

- (1) For turbine engine powered airplanes, a relative humidity of—
 - (i) 80 percent, at and below standard temperatures; and
 - (ii) 34 percent, at and above standard temperatures plus 50 °F.

Between these two temperatures, the relative humidity must vary linearly.