

(2) At speeds that are not less than those at which compliance with the powerplant cooling requirements of §§ 23.1041 to 23.1047 has been demonstrated; and

(3) Unless otherwise specified, with one engine inoperative, at a bank angle not exceeding 5 degrees.

(b) For normal, utility, and acrobatic category reciprocating engine-powered airplanes of 6,000 pounds or less maximum weight, compliance must be shown with § 23.65(a), § 23.67(a), where appropriate, and § 23.77(a) at maximum takeoff or landing weight, as appropriate, in a standard atmosphere.

(c) For normal, utility, and acrobatic category reciprocating engine-powered airplanes of more than 6,000 pounds maximum weight, and turbine engine-powered airplanes in the normal, utility, and acrobatic category, compliance must be shown at weights as a function of airport altitude and ambient temperature, within the operational limits established for takeoff and landing, respectively, with—

(1) Sections 23.65(b) and 23.67(b) (1) and (2), where appropriate, for takeoff, and

(2) Section 23.67(b)(2), where appropriate, and § 23.77(b), for landing.

(d) For commuter category airplanes, compliance must be shown at weights as a function of airport altitude and ambient temperature within the operational limits established for takeoff and landing, respectively, with—

(1) Sections 23.67(c)(1), 23.67(c)(2), and 23.67(c)(3) for takeoff; and

(2) Sections 23.67(c)(3), 23.67(c)(4), and 23.77(c) for landing.

[Doc. No. 27807, 61 FR 5186, Feb. 9, 1996]

§ 23.65 Climb: All engines operating.

(a) Each normal, utility, and acrobatic category reciprocating engine-powered airplane of 6,000 pounds or less maximum weight must have a steady climb gradient at sea level of at least 8.3 percent for landplanes or 6.7 percent for seaplanes and amphibians with—

(1) Not more than maximum continuous power on each engine;

(2) The landing gear retracted;

(3) The wing flaps in the takeoff position(s); and

(4) A climb speed not less than the greater of 1.1 V_{MC} and 1.2 V_{S1} for multi-

engine airplanes and not less than 1.2 V_{S1} for single-engine airplanes.

(b) Each normal, utility, and acrobatic category reciprocating engine-powered airplane of more than 6,000 pounds maximum weight and turbine engine-powered airplanes in the normal, utility, and acrobatic category must have a steady gradient of climb after takeoff of at least 4 percent with

(1) Take off power on each engine;

(2) The landing gear extended, except that if the landing gear can be retracted in not more than seven seconds, the test may be conducted with the gear retracted;

(3) The wing flaps in the takeoff position(s); and

(4) A climb speed as specified in § 23.65(a)(4).

[Doc. No. 27807, 61 FR 5186, Feb. 9, 1996]

§ 23.66 Takeoff climb: One-engine inoperative.

For normal, utility, and acrobatic category reciprocating engine-powered airplanes of more than 6,000 pounds maximum weight, and turbine engine-powered airplanes in the normal, utility, and acrobatic category, the steady gradient of climb or descent must be determined at each weight, altitude, and ambient temperature within the operational limits established by the applicant with—

(a) The critical engine inoperative and its propeller in the position it rapidly and automatically assumes;

(b) The remaining engine(s) at takeoff power;

(c) The landing gear extended, except that if the landing gear can be retracted in not more than seven seconds, the test may be conducted with the gear retracted;

(d) The wing flaps in the takeoff position(s);

(e) The wings level; and

(f) A climb speed equal to that achieved at 50 feet in the demonstration of § 23.53.

[Doc. No. 27807, 61 FR 5186, Feb. 9, 1996]

§ 23.67 Climb: One engine inoperative.

(a) For normal, utility, and acrobatic category reciprocating engine-powered airplanes of 6,000 pounds or less maximum weight, the following apply:

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(1) Except for those airplanes that meet the requirements prescribed in § 23.562(d), each airplane with a V_{SO} of more than 61 knots must be able to maintain a steady climb gradient of at least 1.5 percent at a pressure altitude of 5,000 feet with the—

(i) Critical engine inoperative and its propeller in the minimum drag position;

(ii) Remaining engine(s) at not more than maximum continuous power;

(iii) Landing gear retracted;

(iv) Wing flaps retracted; and

(v) Climb speed not less than $1.2 V_{S1}$.

(2) For each airplane that meets the requirements prescribed in § 23.562(d), or that has a V_{SO} of 61 knots or less, the steady gradient of climb or descent at a pressure altitude of 5,000 feet must be determined with the—

(i) Critical engine inoperative and its propeller in the minimum drag position;

(ii) Remaining engine(s) at not more than maximum continuous power;

(iii) Landing gear retracted;

(iv) Wing flaps retracted; and

(v) Climb speed not less than $1.2V_{S1}$.

(b) For normal, utility, and acrobatic category reciprocating engine-powered airplanes of more than 6,000 pounds maximum weight, and turbine engine-powered airplanes in the normal, utility, and acrobatic category—

(1) The steady gradient of climb at an altitude of 400 feet above the takeoff must be measurably positive with the—

(i) Critical engine inoperative and its propeller in the minimum drag position;

(ii) Remaining engine(s) at takeoff power;

(iii) Landing gear retracted;

(iv) Wing flaps in the takeoff position(s); and

(v) Climb speed equal to that achieved at 50 feet in the demonstration of § 23.53.

(2) The steady gradient of climb must not be less than 0.75 percent at an altitude of 1,500 feet above the takeoff surface, or landing surface, as appropriate, with the—

(i) Critical engine inoperative and its propeller in the minimum drag position;

(ii) Remaining engine(s) at not more than maximum continuous power;

(iii) Landing gear retracted;

(iv) Wing flaps retracted; and

(v) Climb speed not less than $1.2 V_{S1}$.

(c) For commuter category airplanes, the following apply:

(1) *Takeoff; landing gear extended.* The steady gradient of climb at the altitude of the takeoff surface must be measurably positive for two-engine airplanes, not less than 0.3 percent for three-engine airplanes, or 0.5 percent for four-engine airplanes with—

(i) The critical engine inoperative and its propeller in the position it rapidly and automatically assumes;

(ii) The remaining engine(s) at takeoff power;

(iii) The landing gear extended, and all landing gear doors open;

(iv) The wing flaps in the takeoff position(s);

(v) The wings level; and

(vi) A climb speed equal to V_2 .

(2) *Takeoff; landing gear retracted.* The steady gradient of climb at an altitude of 400 feet above the takeoff surface must be not less than 2.0 percent for two-engine airplanes, 2.3 percent for three-engine airplanes, and 2.6 percent for four-engine airplanes with—

(i) The critical engine inoperative and its propeller in the position it rapidly and automatically assumes;

(ii) The remaining engine(s) at takeoff power;

(iii) The landing gear retracted;

(iv) The wing flaps in the takeoff position(s);

(v) A climb speed equal to V_2 .

(3) *Enroute.* The steady gradient of climb at an altitude of 1,500 feet above the takeoff or landing surface, as appropriate, must be not less than 1.2 percent for two-engine airplanes, 1.5 percent for three-engine airplanes, and 1.7 percent for four-engine airplanes with—

(i) The critical engine inoperative and its propeller in the minimum drag position;

(ii) The remaining engine(s) at not more than maximum continuous power;

(iii) The landing gear retracted;

(iv) The wing flaps retracted; and

(v) A climb speed not less than $1.2 V_{S1}$.

(4) *Discontinued approach.* The steady gradient of climb at an altitude of 400

feet above the landing surface must be not less than 2.1 percent for two-engine airplanes, 2.4 percent for three-engine airplanes, and 2.7 percent for four-engine airplanes, with—

- (i) The critical engine inoperative and its propeller in the minimum drag position;
- (ii) The remaining engine(s) at take-off power;
- (iii) Landing gear retracted;
- (iv) Wing flaps in the approach position(s) in which V_{S1} for these position(s) does not exceed 110 percent of the V_{S1} for the related all-engines-operated landing position(s); and
- (v) A climb speed established in connection with normal landing procedures but not exceeding $1.5 V_{S1}$.

[Doc. No. 27807, 61 FR 5186, Feb. 9, 1996]

§ 23.69 Enroute climb/descent.

(a) *All engines operating.* The steady gradient and rate of climb must be determined at each weight, altitude, and ambient temperature within the operational limits established by the applicant with—

- (1) Not more than maximum continuous power on each engine;
- (2) The landing gear retracted;
- (3) The wing flaps retracted; and
- (4) A climb speed not less than $1.3 V_{S1}$.

(b) *One engine inoperative.* The steady gradient and rate of climb/descent must be determined at each weight, altitude, and ambient temperature within the operational limits established by the applicant with—

- (1) The critical engine inoperative and its propeller in the minimum drag position;
- (2) The remaining engine(s) at not more than maximum continuous power;
- (3) The landing gear retracted;
- (4) The wing flaps retracted; and
- (5) A climb speed not less than $1.2 V_{S1}$.

[Doc. No. 27807, 61 FR 5187, Feb. 9, 1996]

§ 23.71 Glide: Single-engine airplanes.

The maximum horizontal distance traveled in still air, in nautical miles, per 1,000 feet of altitude lost in a glide, and the speed necessary to achieve this must be determined with the engine in-

operative, its propeller in the minimum drag position, and landing gear and wing flaps in the most favorable available position.

[Doc. No. 27807, 61 FR 5187, Feb. 9, 1996]

§ 23.73 Reference landing approach speed.

(a) For normal, utility, and acrobatic category reciprocating engine-powered airplanes of 6,000 pounds or less maximum weight, the reference landing approach speed, V_{REF} , must not be less than the greater of V_{MC} , determined in § 23.149(b) with the wing flaps in the most extended takeoff position, and $1.3 V_{SO}$.

(b) For normal, utility, and acrobatic category reciprocating engine-powered airplanes of more than 6,000 pounds maximum weight, and turbine engine-powered airplanes in the normal, utility, and acrobatic category, the reference landing approach speed, V_{REF} , must not be less than the greater of V_{MC} , determined in § 23.149(c), and $1.3 V_{SO}$.

(c) For commuter category airplanes, the reference landing approach speed, V_{REF} , must not be less than the greater of $1.05 V_{MC}$, determined in § 23.149(c), and $1.3 V_{SO}$.

[Doc. No. 27807, 61 FR 5187, Feb. 9, 1996]

§ 23.75 Landing distance.

The horizontal distance necessary to land and come to a complete stop from a point 50 feet above the landing surface must be determined, for standard temperatures at each weight and altitude within the operational limits established for landing, as follows:

(a) A steady approach at not less than V_{REF} , determined in accordance with § 23.73 (a), (b), or (c), as appropriate, must be maintained down to the 50 foot height and—

(1) The steady approach must be at a gradient of descent not greater than 5.2 percent (3 degrees) down to the 50-foot height.

(2) In addition, an applicant may demonstrate by tests that a maximum steady approach gradient steeper than 5.2 percent, down to the 50-foot height, is safe. The gradient must be established as an operating limitation and the information necessary to display