

§ 29.173 Static longitudinal stability.

(a) The longitudinal control must be designed so that a rearward movement of the control is necessary to obtain a speed less than the trim speed, and a forward movement of the control is necessary to obtain a speed more than the trim speed.

(b) With the throttle and collective pitch held constant during the maneuvers specified in § 29.175 (a) through (c), the slope of the control position versus speed curve must be positive throughout the full range of altitude for which certification is requested.

(c) During the maneuver specified in § 29.175(d), the longitudinal control position versus speed curve may have a negative slope within the specified speed range if the negative motion is not greater than 10 percent of total control travel.

[Amdt. 29-24, 49 FR 44436, Nov. 6, 1984]

§ 29.175 Demonstration of static longitudinal stability.

(a) *Climb.* Static longitudinal stability must be shown in the climb condition at speeds from 0.85 V_Y , or 15 knots below V_Y , whichever is less, to 1.2 V_Y or 15 knots above V_Y , whichever is greater, with—

- (1) Critical weight;
- (2) Critical center of gravity;
- (3) Maximum continuous power;
- (4) The landing gear retracted; and
- (5) The rotorcraft trimmed at V_Y .

(b) *Cruise.* Static longitudinal stability must be shown in the cruise condition at speeds from 0.7 V_H or 0.7 V_{NE} , whichever is less, to 1.1 V_H or 1.1 V_{NE} , whichever is less, with—

- (1) Critical weight;
- (2) Critical center of gravity;
- (3) Power for level flight at 0.9 V_H or 0.9 V_{NE} , whichever is less;
- (4) The landing gear retracted, and
- (5) The rotorcraft trimmed at 0.9 V_H or 0.9 V_{NE} , whichever is less.

(c) *Autorotation.* Static longitudinal stability must be shown in autorotation at airspeeds from 0.5 times the speed for minimum rate of descent, or 0.5 times the maximum range glide speed for Category A rotorcraft, to V_{NE} or to 1.1 V_{NE} (power-off) if V_{NE} (power-off) is established under § 29.1505(c), and with—

- (1) Critical weight;
- (2) Critical center of gravity;
- (3) Power off;
- (4) The landing gear—
 - (i) Retracted; and
 - (ii) Extended; and
- (5) The rotorcraft trimmed at appropriate speeds found necessary by the Administrator to demonstrate stability throughout the prescribed speed range.

(d) *Hovering.* For helicopters, the longitudinal cyclic control must operate with the sense, direction of motion, and position as prescribed in § 29.173 between the maximum approved rearward speed and a forward speed of 17 knots with—

- (1) Critical weight;
- (2) Critical center of gravity;
- (3) Power required to maintain an approximate constant height in ground effect;
- (4) The landing gear extended; and
- (5) The helicopter trimmed for hovering.

(Secs. 313(a), 601, 603, 604, and 605 of the Federal Aviation Act of 1958 (49 U.S.C. 1354(a), 1421, 1423, 1424, and 1425); and sec. 6(c), Dept. of Transportation Act (49 U.S.C. 1655(c)))

[Doc. No. 5084, 29 FR 16150, Dec. 3, 1964, as amended by Amdt. 29-3, 33 FR 966, Jan. 26, 1968; Amdt. 29-12, 41 FR 55471, Dec. 20, 1976; Amdt. 29-15, 43 FR 2327, Jan. 16, 1978; Amdt. 29-24, 49 FR 44436, Nov. 6, 1984]

§ 29.177 Static directional stability.

Static directional stability must be positive with throttle and collective controls held constant at the trim conditions specified in § 29.175 (a), (b), and (c). Sideslip angle must increase steadily with directional control deflection for sideslip angles up to $\pm 10^\circ$ from trim. Sufficient cues must accompany sideslip to alert the pilot when approaching sideslip limits.

[Amdt. 29-24, 49 FR 44436, Nov. 6, 1984]

§ 29.181 Dynamic stability: Category A rotorcraft.

Any short-period oscillation occurring at any speed from V_Y to V_{NE} must be positively damped with the primary flight controls free and in a fixed position.

[Amdt. 29-24, 49 FR 44437, Nov. 6, 1984]