

§ 29.171 Stability: general.

The rotorcraft must be able to be flown, without undue pilot fatigue or strain, in any normal maneuver for a period of time as long as that expected in normal operation. At least three landings and takeoffs must be made during this demonstration.

§ 29.173 Static longitudinal stability.

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

(b) Throughout the full range of altitude for which certification is requested, with the throttle and collective pitch held constant during the maneuvers specified in § 29.175(a) through (d), the slope of the control position versus airspeed curve must be positive. However, in limited flight conditions or modes of operation determined by the Administrator to be acceptable, the slope of the control position versus airspeed curve may be neutral or negative if the rotorcraft possesses flight characteristics that allow the pilot to maintain airspeed within ± 5 knots of the desired trim airspeed without exceptional piloting skill or alertness.

[Amdt. 29-24, 49 FR 44436, Nov. 6, 1984, as amended by Amdt. 29-51, 73 FR 11001, Feb. 29, 2008]

§ 29.175 Demonstration of static longitudinal stability.

(a) *Climb.* Static longitudinal stability must be shown in the climb condition at speeds from $V_y - 10$ kt to $V_y + 10$ kt 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 $0.8 V_{NE} - 10$ kt to $0.8 V_{NE} + 10$ kt or, if V_H is less than $0.8 V_{NE}$, from $V_H - 10$ kt to $V_H + 10$ kt, with—

- (1) Critical weight;
- (2) Critical center of gravity;
- (3) Power for level flight at $0.8 V_{NE}$ or V_H , whichever is less;

- (4) The landing gear retracted; and
- (5) The rotorcraft trimmed at $0.8 V_{NE}$ or V_H , whichever is less.

(c) V_{NE} . Static longitudinal stability must be shown at speeds from $V_{NE} - 20$ kt to V_{NE} with—

- (1) Critical weight;
- (2) Critical center of gravity;
- (3) Power required for level flight at $V_{NE} - 10$ kt or maximum continuous power, whichever is less;
- (4) The landing gear retracted; and
- (5) The rotorcraft trimmed at $V_{NE} - 10$ kt.

(d) *Autorotation.* Static longitudinal stability must be shown in autorotation at—

(1) Airspeeds from the minimum rate of descent airspeed $- 10$ kt to the minimum rate of descent airspeed $+ 10$ kt, with—

- (i) Critical weight;
- (ii) Critical center of gravity;
- (iii) The landing gear extended; and
- (iv) The rotorcraft trimmed at the minimum rate of descent airspeed.

(2) Airspeeds from the best angle-of-glides airspeed $- 10$ kt to the best angle-of-glides airspeed $+ 10$ kt, with—

- (i) Critical weight;
- (ii) Critical center of gravity;
- (iii) The landing gear retracted; and
- (iv) The rotorcraft trimmed at the best angle-of-glides airspeed.

[Amdt. 29-51, 73 FR 11001, Feb. 29, 2008]

§ 29.177 Static directional stability.

(a) The directional controls must operate in such a manner that the sense and direction of motion of the rotorcraft following control displacement are in the direction of the pedal motion with throttle and collective controls held constant at the trim conditions specified in § 29.175(a), (b), (c), and (d). Sideslip angles must increase with steadily increasing directional control deflection for sideslip angles up to the lesser of—

(1) ± 25 degrees from trim at a speed of 15 knots less than the speed for minimum rate of descent varying linearly to ± 10 degrees from trim at V_{NE} ;

(2) The steady-state sideslip angles established by § 29.351;

(3) A sideslip angle selected by the applicant, which corresponds to a sideforce of at least 0.1g; or