

Code of Federal Regulations

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▼Sec. 25.175

Part 25 AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY AIRPLANES	
Subpart B--Flight	Stability

Sec. 25.175

Demonstration of static longitudinal stability.

Static longitudinal stability must be shown as follows:

(a) *Climb*. The stick force curve [must have a stable slope] at speeds between 85 and 115 percent of the speed at which the airplane--

(1) Is trimmed, with--

(i) Wing flaps retracted;

(ii) Landing gear retracted;

(iii) Maximum takeoff weight; and

(iv) 75 percent of maximum continuous power for reciprocating engines or the maximum power or thrust selected by the applicant as an operating limitation for use during climb for turbine engines; and

(2) Is trimmed at the speed for best rate-of-climb except that the speed need not be less than $1.4 V_{S1}$.

[(b) *Cruise*. Static longitudinal stability must be shown in the cruise condition as follows:

(1) With the landing gear retracted at high speed, the stick force curve must have a stable slope at all speeds within a range which is the greater of 15 percent of the trim speed plus the resulting free return speed range, or 50 knots plus the resulting free return speed range, above and below the trim speed (except that the speed range need not include speeds less than $1.4 V_{S1}$, nor speeds greater than V_{FC} / M_{FC} , nor speeds that require a stick force of more than 50 pounds), with--

(i) The wing flaps retracted;

(ii) The center of gravity in the most adverse position (see Sec. 25.27);

(iii) The most critical weight between the maximum takeoff and maximum landing weights;

(iv) 75 percent of maximum continuous power for reciprocating engines or, for turbine engines, the maximum cruising power selected by the applicant as an operating limitation (see Sec. 25.1521), except that the power need not exceed that required at V_{MO} / M_{MO} ; and

(v) The airplane trimmed for level flight with the power required in paragraph (b)(1)(iv) above.

(2) With the landing gear retracted at low speed, the stick force curve must have a stable

slope at all speeds within a range which is the greater of 15 percent of the trim speed plus the resulting free return speed range, or 50 knots plus the resulting free return speed range, above and below the trim speed (except that the speed range need not include speeds less than $1.4 V_{S1}$, nor speeds greater than the minimum speed of the applicable speed range prescribed in paragraph (b)(1), nor speeds that require a stick force of more than 50 pounds), with--

(i) Wing flaps, center of gravity position, and weight as specified in paragraph (b)(1) of this section;

(ii) Power required for level flight at a speed equal to $\frac{V_{MO} + 1.4V_{S1}}{2}$; and

(iii) The airplane trimmed for level flight with the power required in paragraph (b)(2)(ii) of this section.

(3) With the landing gear extended, the stick force curve must have a stable slope at all speeds within a range which is the greater of 15 percent of the trim speed plus the resulting free return speed range, or 50 knots plus the resulting free return speed range, above and below the trim speed (except that the speed range need not include speeds less than $1.4 V_{S1}$, nor speeds greater than V_{LE} , nor speeds that require a stick force of more than 50 pounds), with--

(i) Wing flap, center of gravity position, and weight as specified in paragraph (b)(1) of this section;

(ii) 75 percent of maximum continuous power for reciprocating engines or, for turbine engines, the maximum cruising power selected by the applicant as an operating limitation, except that the power need not exceed that required for level flight at V_{LE} ; and

(iii) The aircraft trimmed for level flight with the power required in paragraph (b)(3)(ii) of this section.

(c) *Approach*. The stick force curve [must have a stable slope] at speeds between $1.1 V_{S1}$, and $1.8 V_{S1}$, with--

(1) Wing flaps in the approach position;

(2) Landing gear retracted;

(3) Maximum landing weight; and

(4) The airplane trimmed at $1.4 V_{S1}$, with enough power to maintain level flight at this speed.

(d) *Landing*. The stick force curve [must have a stable slope,] and the stick force may not exceed 80 pounds, at speeds between $1.1 V_{S0}$ and $1.8 V_{S0}$ with--

(1) Wing flaps in the landing position;

(2) Landing gear extended;

(3) Maximum landing weight;

(4) Power or thrust off on the engines; and

(5) The airplane trimmed at $1.4 V_{S0}$ with power or thrust off.