(c) **Landing.** The stick force curve must have a stable slope at speeds between 1.1 $V_{S1}$ and 1.8 $V_{S1}$ with—

1. Flaps in the landing position; and
2. Landing gear extended; and
3. The airplane trimmed at—
   (i) $V_{REF}$, or the minimum trim speed if higher, with power off; and
   (ii) $V_{REF}$ with enough power to maintain a 3 degree angle of descent.

[Doc. No. 27807, 61 FR 5190, Feb. 9, 1996]

§ 23.177 **Static directional and lateral stability.**

(a)(1) The static directional stability, as shown by the tendency to recover from a wings level sideslip with the rudder free, must be positive for any landing gear and flap position appropriate to the takeoff, climb, cruise, approach, and landing configurations. This must be shown with symmetrical power up to maximum continuous power, and at speeds from 1.2 $V_{S1}$ up to $V_{FE}$, $V_{LE}$, $V_{NO}$, $V_{FC}/M_{FC}$, whichever is appropriate.

(2) The angle of sideslip for these tests must be appropriate to the type of airplane, but in no case may the constant heading sideslip angle be less than that obtainable with a 10 degree bank or, if less, the maximum bank angle obtainable with full rudder deflection or 150 pound rudder force.

(c) Paragraph (b) of this section does not apply to acrobatic category airplanes certificated for inverted flight.

(d)(1) In straight, steady slips at 1.2 $V_{S1}$ for any landing gear and flap position appropriate to the takeoff, climb, cruise, approach, and landing configurations and at speeds from 1.2 $V_{S1}$ to $V_{REF}$, $V_{LE}$, $V_{NO}$, $V_{FC}/M_{FC}$, whichever is appropriate.

(2) At larger slip angles, up to the angle at which the full rudder or aileron control is used or a control force limit contained in §23.143 is reached, the aileron and rudder control movements and forces may not reverse as the angle of sideslip is increased up to the maximum appropriate to the type of airplane.

(3) Rapid entry into, and recovery from, a maximum sideslip considered appropriate for the airplane may not result in uncontrollable flight characteristics.


§ 23.181 **Dynamic stability.**

(a) Any short period oscillation not including combined lateral-directional oscillations occurring between the stalling speed and the maximum allowable speed appropriate to the configuration of the airplane must be heavily damped with the primary controls—

1. Free; and
2. In a fixed position.

(b) Any combined lateral-directional oscillations (Dutch roll) occurring between the stalling speed and the maximum allowable speed ($V_{FE}$, $V_{LE}$, $V_{NO}$, $V_{FC}/M_{FC}$) appropriate to the configuration of the airplane with the primary
§ 23.201 Wings level stall.

(a) It must be possible to produce and
to correct roll by unreversed use of the
rolling control and to produce and to
correct yaw by unreversed use of the
directional control, up to the time the airplane stalls.

(b) The wings level stall characteristics must be demonstrated in flight as follows. Starting from a speed at least 10 knots above the stall speed, the elevator control must be pulled back so that the rate of speed reduction will not exceed one knot per second until a stall is produced, as shown by either:

(1) An uncontrollable downward
pitching motion of the airplane;

(2) A downward pitching motion of the airplane that results from the activation of a stall avoidance device (for example, stick pusher); or

(3) The control reaching the stop.

(c) Normal use of elevator control for recovery is allowed after the downward
pitching motion of paragraphs (b)(1) or
(b)(2) of this section has unmistakably
been produced, or after the control has
been held against the stop for not less
than the longer of two seconds or the
time employed in the minimum steady
slight speed determination of §23.49.

(d) During the entry into and the recov-
ery from the maneuver, it must be
possible to prevent more than 15 de-
grees of roll or yaw by the normal use
of controls except as provided for in
paragraph (e) of this section.

(e) For airplanes approved with a maximum operating altitude at or
above 25,000 feet during the entry into
and the recovery from stalls performed
at or above 25,000 feet, it must be pos-
sible to prevent more than 25 degrees of
roll or yaw by the normal use of con-
trols.

(f) Compliance with the requirements of this section must be shown under
the following conditions:

(1) Wing flaps: Retracted, fully ex-
tended, and each intermediate normal
operating position, as appropriate for
the phase of flight.

(2) Landing gear: Retracted and ex-
tended as appropriate for the altitude.

(3) Cowl flaps: Appropriate to configu-
ration.

(4) Spoilers/speedbrakes: Retracted and extended unless they have no measureable effect at low speeds.

(5) Power:

(i) Power/Thrust off; and

(ii) For reciprocating engine powered
airplanes: 75 percent of maximum con-
tinuous power. However, if the power-
to-weight ratio at 75 percent of max-
imum continuous power results in
nose-high attitudes exceeding 30 de-
grees, the test may be carried out with
the power required for level flight in
the landing configuration at maximum
landing weight and a speed of 1.4 V_{SO},
except that the power may not be less
than 50 percent of maximum continu-
ous power; or

(iii) For turbine engine powered air-
planes: The maximum engine thrust,
except that it need not exceed the
thrust necessary to maintain level
flight at 1.5 V_{SI} (where V_{SI} corresponds
to the stalling speed with flaps in the
approach position, the landing gear re-
tracted, and maximum landing weight).