

# Code of Federal Regulations

**This Section of CFR is No Longer Current.**

## ▼ Sec. 25.335

Part 25 AIRWORTHINESS STANDARDS: TRANSPORT CATEGORY AIRPLANES	
Subpart C--Structure	Flight Maneuver and Gust Conditions

### Sec. 25.335

Design airspeeds.

The selected design airspeeds are equivalent airspeeds (EAS). Estimated values of  $V_{S0}$  and  $V_{S1}$  must be conservative.

(a) *Design cruising speed,  $V_C$* . For  $V_C$ , the following apply:

- (1) The minimum value of  $V_C$  must be sufficiently greater than  $V_B$  to provide for inadvertent speed increases likely to occur as a result of severe atmospheric turbulence.
- (2) In the absence of a rational investigation substantiating the use of other values,  $V_C$  may not be less than  $V_B + 43$  knots. However, it need not exceed the maximum speed in level flight at maximum continuous power for the corresponding altitude.
- (3) At altitudes where  $V_D$  is limited by Mach number,  $V_C$  may be limited to a selected Mach number.

[(b) *Design dive speed,  $V_D$* .  $V_D$  must be selected so that  $V_C / M_C$  is not greater than  $0.8 V_D / M_D$ , or so that the minimum speed margin between  $V_C / M_C$  and  $V_D / M_D$  is the greater of the following values:

- (1) From an initial condition of stabilized flight at  $V_C / M_C$ , the airplane is upset, flown for 20 seconds along a flight path  $7.5^\circ$  below the initial path, and then pulled up at a load factor of 1.5g (0.5g acceleration increment). The speed increase occurring in this maneuver may be calculated if reliable or conservative aerodynamic data is used. Power as specified in Sec. 25.175(b)(1)(iv) is assumed until the pullup is initiated, at which time power reduction and the use of pilot controlled drag devices may be assumed;
- (2) The minimum speed margin must be enough to provide for atmospheric variations (such as horizontal gusts, and penetration of jet streams and cold fronts) and for instrument errors and airframe production variations. These factors may be considered on a probability basis. However, the margin at altitude where  $M_C$  is limited by compressibility effects may not be less than 0.05M.]

(c) *Design maneuvering speed  $V_A$* . For  $V_A$ , the following apply:

- (1)  $V_A$  may not be less than  $V_{S1} \sqrt{n}$  where--
  - (i)  $n$  is the limit positive maneuvering load factor at  $V_C$ ; and
  - (ii)  $V_{S1}$  is the stalling speed with flaps retracted.
- (2)  $V_A$  and  $V_S$  must be evaluated at the design weight and altitude under consideration.
- (3)  $V_A$  need not be more than  $V_C$  or the speed at which the positive  $C_N$  vs  $C_L$  curve intersects the positive maneuver load factor line, whichever is less.

- (d) *Design speed for maximum gust intensity*,  $V_B$ . For  $V_B$ , the following apply:
- (1)  $V_B$  may not be less than the speed determined by the intersection of the line representing the maximum positive lift  $C_{N \max}$  and the line representing the rough air gust velocity on the gust  $V$ - $n$  diagram, or  $(\sqrt{ng}) V_{S1}$ , whichever is less, where--
    - (i)  $ng$  is the positive airplane gust load factor due to gust, at speed  $V_C$  (in accordance with Sec. 25.341), and at the particular weight under consideration; and
    - (ii)  $V_{S1}$  is the stalling speed with the flaps retracted at the particular weight under consideration.
  - (2)  $V_B$  need not be greater than  $V_C$ .
- (e) *Design flap speeds*,  $V_F$ . For  $V_F$ , the following apply:
- (1) The design flap speed for each flap position (established in accordance with Sec. 25.697(a)) must be sufficiently greater than the operating speed recommended for the correspondence stage of flight (including balked landings) to allow for probable variations in control of airspeed and for transition from one flap position to another.
  - (2) If an automatic flap positioning or load limiting device is used, the speeds and corresponding flap positions programmed or allowed by the device may be used.
  - (3)  $V_F$  may not be less than--
    - (i)  $1.6 V_{S1}$  with the flaps in takeoff position at maximum takeoff weight;
    - (ii)  $1.8 V_{S1}$  with the flaps in approach position at maximum landing weight; and
    - (iii)  $1.8 V_{S0}$  with the flaps in landing position at maximum landing weight.
- [(f) *Design drag device speeds*,  $V_{DD}$ . The selected design speed for each drag device must be sufficiently greater than the speed recommended for the operation of the device to allow for probable variations in speed control. For drag devices intended for use in high speed descents,  $V_{DD}$  may not be less than  $V_D$ . When an automatic drag device positioning or load limiting means is used, the speeds and corresponding drag device positions programmed or allowed by the automatic means must be used for design.]

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