

# Code of Federal Regulations

**This Section of CFR is No Longer Current.**

## ▼ Sec. 25.107

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

### Sec. 25.107

Takeoff speeds.

[(a)  $V_1$  must be established in relation to  $V_{EF}$  as follows:

(1)  $V_{EF}$  is the calibrated airspeed at which the critical engine is assumed to fail.  $V_{EF}$  must be selected by the applicant, but may not be less than  $V_{MCG}$  determined under Sec. 25.149(e).

(2)  $V_1$ , in terms of calibrated airspeed, is the takeoff decision speed selected by the applicant; however,  $V_1$  may not be less than  $V_{EF}$  plus the speed gained with the critical engine inoperative during the time interval between the instant at which the critical engine is failed, and the instant at which the pilot recognizes and reacts to the engine failure, as indicated by the pilot's application of the first retarding means during accelerate-stop tests.]

(b)  $V_{2min}$ , in terms of calibrated airspeed, may not be less than--

(1)  $1.2 V_S$  for--

(i) Two-engine and three-engine turbopropeller and reciprocating engine powered airplanes; and

(ii) Turbojet powered airplanes without provisions for obtaining a significant reduction in the one-engine-inoperative power-on stalling speed;

(2)  $1.15 V_S$  for--

(i) Turbopropeller and reciprocating engine powered airplanes with more than three engines; and

(ii) Turbojet powered airplanes with provisions for obtaining a significant reduction in the one-engine-inoperative power-on stalling speed; and

(3)  $1.10$  times  $V_{MC}$  established under Sec. 25.149.

(c)  $V_2$ , in terms of calibrated airspeed, must be selected by the applicant to provide at least the gradient of climb required by Sec. 25.121(b) but may not be less than--

(1)  $V_{2min}$ , and

(2)  $V_R$  plus the speed increment attained (in accordance with Sec. 25.111(c)(2)) before reaching a height of 35 feet above the takeoff surface.

[(d)  $V_{MU}$  is the calibrated airspeed at and above which the airplane can safely lift off the ground, and continue the takeoff.  $V_{MU}$  speeds must be selected by the applicant throughout the range of thrust-to-weight ratios to be certificated. These speeds may be established from free air data if these data are verified by ground takeoff tests.]

(e)  $V_R$ , in terms of calibrated airspeed, must be selected in accordance with the

conditions of subparagraphs (1) through (4) of this paragraph:

(1)  $V_R$  may not be less than--

(i)  $V_1$ ;

(ii) 105 percent of  $V_{MC}$ ;

(iii) The speed (determined in accordance with Sec. 25.111(c)(2)) that allows reaching  $V_2$  before reaching a height of 35 feet above the takeoff surface; or

[(iv) A speed that, if the airplane is rotated at its maximum practicable rate, will result in a  $V_{LOF}$  of not less than 110 percent of  $V_{MU}$  in the all-engines-operating condition and not less than 105 percent of  $V_{MU}$  determined at the thrust-to-weight ratio corresponding to the one-engine-inoperative condition.]

(2) For any given set of conditions (such as weight, configuration, and temperature), a single value of  $V_R$ , obtained in accordance with this paragraph, must be used to show compliance with both the one-engine-inoperative and the all-engines-operating takeoff provisions.

(3) It must be shown that the one-engine-inoperative takeoff distance, using a rotation speed of 5 knots less than  $V_R$  established in accordance with subparagraphs (1) and (2) of this paragraph, does not exceed the corresponding one-engine-inoperative takeoff distance using the established  $V_R$ . The takeoff distances must be determined in accordance with Sec. 25.113(a)(1).

(4) Reasonably expected variations in service from the established takeoff procedures for the operation of the airplane (such as over-rotation of the airplane and out-of-trim conditions) may not result in unsafe flight characteristics or in marked increases in the scheduled takeoff distances established in accordance with Sec. 25.113(a).

(f)  $V_{LOF}$  is the calibrated airspeed at which the airplane first becomes airborne.

Amdt. 25-42, Eff. 3/1/78