Federal Aviation Administration, DOT

§ 23.49 Stalling period.

(a) $V_{SO}$ and $V_{S1}$ are the stalling speeds or the minimum steady flight speeds, in knots (CAS), at which the airplane is controllable with—

(1) For reciprocating engine-powered airplanes, the engine(s) idling, the throttle(s) closed or at not more than the power necessary for zero thrust at a speed not more than 110 percent of the stalling speed;
§ 23.51 Takeoff speeds.

(a) For normal, utility, and acrobatic category airplanes, rotation speed, \(V_R\), is the speed at which the pilot makes a control input, with the intention of lifting the airplane out of contact with the runway or water surface.

(1) For multiengine landplanes, \(V_R\) must not be less than the greater of 1.05 \(V_{MC}\) or 1.10 \(V_{S1}\);

(2) For single-engine landplanes, \(V_R\) must not be less than \(V_{S1}\); and

(3) For seaplanes and amphibians taking off from water, \(V_R\) may be any speed that is shown to be safe under all reasonably expected conditions, including turbulence and complete failure of the critical engine.

(b) For normal, utility, and acrobatic category airplanes, the speed at 50 feet above the takeoff surface level must not be less than:

(1) or multiengine airplanes, the highest of—

(i) A speed that is shown to be safe for continued flight (or emergency landing, if applicable) under all reasonably expected conditions, including turbulence and complete failure of the critical engine;

(ii) 1.10 \(V_{MC}\); or

(iii) 1.20 \(V_{S1}\).

(2) For single-engine airplanes, the higher of—

(i) A speed that is shown to be safe under all reasonably expected conditions, including turbulence and complete engine failure; or

(ii) 1.20 \(V_{S1}\).

(c) For commuter category airplanes, the following apply:

(1) \(V_1\) must be established in relation to \(V_{EF}\) as follows:

(i) \(V_{EF}\) is the calibrated airspeed at which the critical engine is assumed to fail. \(V_{EF}\) must be selected by the applicant but must not be less than 1.05 \(V_{MC}\) determined under §23.149(b) or, at the option of the applicant, not less than \(V_{MCG}\) determined under §23.149(f).

(ii) The takeoff decision speed, \(V_1\), is the calibrated airspeed on the ground at which, as a result of engine failure or other reasons, the pilot is assumed to have made a decision to continue or discontinue the takeoff. The takeoff decision speed, \(V_1\), must be selected by the applicant but must 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 the accelerate-stop determination of §23.55.

(2) The rotation speed, \(V_R\), in terms of calibrated airspeed, must be selected by the applicant and must not be less than the greatest of the following:

(i) \(V_1\);

(ii) 1.05 \(V_{MC}\) determined under §23.149(b);

(iii) 1.10 \(V_{S1}\); or

(iv) The speed that allows attaining the initial climb-out speed, \(V_2\), before