Federal Aviation Administration, DOT § 25.111

### Takeoff path.

**(a)** The takeoff path extends from a standing start to a point in the takeoff at which the airplane is 1,500 feet above the takeoff surface, or at which the transition from the takeoff to the en route configuration is completed and $V_{FTO}$ is reached, whichever point is higher. In addition—

1. The takeoff path must be based on the procedures prescribed in §25.101(f);
2. The airplane must be accelerated on the ground to $V_{EF}$, at which point the critical engine must be made inoperative and remain inoperative for the rest of the takeoff; and
3. After reaching $V_{EF}$, the airplane must be accelerated to $V_{2}$.

**(b)** During the acceleration to speed $V_{2}$, the nose gear may be raised off the ground at a speed not less than $V_{R}$. However, landing gear retraction may not be begun until the airplane is airborne.

**(c)** During the takeoff path determination in accordance with paragraphs (a) and (b) of this section...

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**Tire Pressure (psi)** | **Maximum Braking Coefficient (tire-to-ground)**
---|---
50 | $\mu_{\text{brake}} = 0.1470 \left( \frac{V}{100} \right)^3 - 1.050 \left( \frac{V}{100} \right)^4 + 2.673 \left( \frac{V}{100} \right)^3 - 2.683 \left( \frac{V}{100} \right)^2 + 0.403 \left( \frac{V}{100} \right) + 0.859$
100 | $\mu_{\text{brake}} = 0.1106 \left( \frac{V}{100} \right)^5 - 0.813 \left( \frac{V}{100} \right)^4 + 2.130 \left( \frac{V}{100} \right)^3 - 2.200 \left( \frac{V}{100} \right)^2 + 0.317 \left( \frac{V}{100} \right) + 0.807$
200 | $\mu_{\text{brake}} = 0.0498 \left( \frac{V}{100} \right)^5 - 0.398 \left( \frac{V}{100} \right)^4 + 1.140 \left( \frac{V}{100} \right)^3 - 1.285 \left( \frac{V}{100} \right)^2 + 0.140 \left( \frac{V}{100} \right) + 0.701$
300 | $\mu_{\text{brake}} = 0.0314 \left( \frac{V}{100} \right)^5 - 0.247 \left( \frac{V}{100} \right)^4 + 0.703 \left( \frac{V}{100} \right)^3 - 0.779 \left( \frac{V}{100} \right)^2 - 0.00954 \left( \frac{V}{100} \right) + 0.614$

Where—

- Tire Pressure = maximum airplane operating tire pressure (psi);
- $\mu_{\text{brake}}$ = maximum tire-to-ground braking coefficient;
- $V$ = airplane true ground speed (knots); and
- Linear interpolation may be used for tire pressures other than those listed.

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This table and equation are used to determine the maximum braking coefficient for a given tire pressure and ground speed. The formulae are derived from the Federal Aviation Administration's regulations and provide a method for calculating the maximum braking coefficient based on tire pressure and ground speed.
§ 25.113 Takeoff distance and takeoff run.

(a) Takeoff distance on a dry runway is the greater of—

(1) The horizontal distance along the takeoff path from the start of the takeoff to the point at which the airplane is 35 feet above the takeoff surface, determined under § 25.111 for a dry runway; or

(2) The horizontal distance along the takeoff path, with all engines operating, from the point where the airplane is 400 feet above the takeoff surface up to the point where the airplane is 35 feet above the takeoff surface, determined under § 25.111 for a dry runway.

(b) Takeoff distance on a wet runway is the greater of—

(1) The horizontal distance along the takeoff path, with all engines operating, from the point where the airplane is 400 feet above the takeoff surface up to the point where the airplane is 15 feet above the takeoff surface, determined under § 25.111 for a wet runway; or

(2) The horizontal distance along the takeoff path, with all engines operating, from the point where the airplane is 35 feet above the takeoff surface up to the point where the airplane is 15 feet above the takeoff surface, determined under § 25.111 for a wet runway.