This Regulation is the airworthiness standard for multi-engine Part 23 airplanes, i.e. for designing and certifying, not for their operational use. The V_{MC} definition should therefore not be used unchanged in flight manuals and pilot course books.

ELECTRONIC CODE OF FEDERAL REGULATIONS

In comment text boxes, V_{MCA} (A for Airborne) is used rather than V_{MC}. These comments were added by a Test Pilot School graduate of AvioConsult(.com).

e-CFR Data is current as of September 8, 2014

Two cases:
1. Maintain, i.e. recover control after a sudden failure to straight flight;
2. Maintain straight flight while an engine is inoperative, while banking the bank angle that the tail design engineeer used to size the vertical tail (for adequately counteracting the adverse yaw, and zero sideslip for maximum climb performance).

Highest CAS for cases1 & 2 = V_{MCA}. V_{MCA} is not for turning!

Title 14: Aeronautics and Space
PART 23—AIRWORTHINESS STANDARDS: NORMAL, UTILITY, ACROBATIC, AND COMMUTER CATEGORY AIRPLANES
Subpart B—Flight

Case1. Case 2.

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§23.149 Minimum control speed.

(a) V_{MC} is the calibrated airspeed at which, when the critical engine is suddenly made inoperative, it is possible to maintain control of the airplane with that engine still inoperative, and thereafter maintain straight flight at the same speed with an angle of bank of not more than 5 degrees. The method used to simulate critical engine failure must represent the most critical mode of powerplant failure expected in service with respect to controllability.

(b) V_{MC} for takeoff must not exceed 1.2 V_{S1}, where V_{S1} is determined at the maximum takeoff weight. V_{MC} must be determined with the most unfavorable weight and center of gravity position and with the airplane airborne and the ground effect negligible, for the takeoff configuration(s) with—

(1) Maximum available takeoff power initially on each engine;

(2) The airplane trimmed for takeoff;

(3) Flaps in the takeoff position(s);

(4) Landing gear retracted; and

(5) All propeller controls in the recommended takeoff position throughout.

The smaller the tail, the higher the airspeed required for maintaining directional control (V_{MCA}). This V_{MCA} limitation prevents the tail from being designed too small (cheaper, less heavy).

Refer to the Flight Test Guides:
For V_{MCA}:
- the most unfavorable weight is low weight.
- the most unfavorable center of gravity position is aft.

Refer to the Flight Test Guide: Autofeather if installed, otherwise windmilling.

(c) For all airplanes except reciprocating engine-powered airplanes of 6,000 pounds or less maximum weight, the conditions of paragraph (a) of this section must also be met for the landing configuration with—

(1) Maximum available takeoff power initially on each engine;

(2) The airplane trimmed for an approach, with all engines operating, at V_{REF}, at an approach gradient equal to the steepest used in the landing distance demonstration of §23.75;

(3) Flaps in the landing position;

(4) Landing gear extended; and

(5) All propeller controls in the position recommended for approach with all engines operating.

(d) A minimum speed to intentionally render the critical engine inoperative must be established and designated as the safe, intentional, one-engine-inoperative speed, V_{SSE}.

(e) At V_{MC}, the rudder pedal force required to maintain control must not exceed 150 pounds and it must not be necessary to reduce power of the operative engine(s). During the maneuver, the airplane must not assume any dangerous attitude and it must be possible to prevent a heading change of more than 20 degrees.

(f) At the option of the applicant, to comply with the requirements of §23.51(c)(1), V_{MCG} may be determined. V_{MCG} is the minimum control speed on the ground, and is the calibrated airspeed during the takeoff run at which, when the critical engine is suddenly made inoperative, it is possible to maintain control of the airplane using the rudder control alone (without the use of nosewheel steering), as limited by 150 pounds of force, and using the lateral control to the extent of keeping the wings level to enable the takeoff to be safely continued. In the determination of V_{MCG}, assuming that the path of the airplane accelerating with all engines operating is along the centerline of the runway, its path from the point at which the critical engine is made inoperative to the point at which recovery to a direction parallel to the centerline is completed may not deviate more than 30 feet laterally from the centerline at any point. V_{MCG} must be established with—

(1) The airplane in each takeoff configuration or, at the option of the applicant, in the most critical takeoff configuration;

(2) Maximum available takeoff power on the operating engines;

(3) The most unfavorable center of gravity;

(4) The airplane trimmed for takeoff; and

(5) The most unfavorable weight in the range of takeoff weights.

[Doc. No. 27807, 61 FR 5189, Feb. 9, 1996]
