

(3) It receives its electrical power from the bus that provides the maximum reliability for operation of the flight recorder without jeopardizing service to essential or emergency loads;

(4) There is an aural or visual means for preflight checking of the recorder for proper recording of data in the storage medium.

(5) Except for recorders powered solely by the engine-driven electrical generator system, there is an automatic means to simultaneously stop a recorder that has a data erasure feature and prevent each erasure feature from functioning, within 10 minutes after crash impact; and

(6) There is a means to record data from which the time of each radio transmission either to or from ATC can be determined.

(b) Each nonejectable record container must be located and mounted so as to minimize the probability of container rupture resulting from crash impact and subsequent damage to the record from fire. In meeting this requirement the record container must be located as far aft as practicable, but need not be aft of the pressurized compartment, and may not be where aft-mounted engines may crush the container upon impact.

(c) A correlation must be established between the flight recorder readings of airspeed, altitude, and heading and the corresponding readings (taking into account correction factors) of the first pilot's instruments. The correlation must cover the airspeed range over which the airplane is to be operated, the range of altitude to which the airplane is limited, and 360 degrees of heading. Correlation may be established on the ground as appropriate.

(d) Each recorder container must—

(1) Be either bright orange or bright yellow;

(2) Have reflective tape affixed to its external surface to facilitate its location under water; and

(3) Have an underwater locating device, when required by the operating rules of this chapter, on or adjacent to the container which is secured in such a manner that they are not likely to be separated during crash impact.

(e) Any novel or unique design or operational characteristics of the aircraft shall be evaluated to determine if any dedicated parameters must be recorded on flight recorders in addition to or in place of existing requirements.

[Amdt. 25-8, 31 FR 127, Jan. 6, 1966, as amended by Amdt. 25-25, 35 FR 13192, Aug. 19, 1970; Amdt. 25-37, 40 FR 2577, Jan. 14, 1975; Amdt. 25-41, 42 FR 36971, July 18, 1977; Amdt. 25-65, 53 FR 26144, July 11, 1988]

#### § 25.1461 Equipment containing high energy rotors.

(a) Equipment containing high energy rotors must meet paragraph (b), (c), or (d) of this section.

(b) High energy rotors contained in equipment must be able to withstand damage caused by malfunctions, vibration, abnormal speeds, and abnormal temperatures. In addition—

(1) Auxiliary rotor cases must be able to contain damage caused by the failure of high energy rotor blades; and

(2) Equipment control devices, systems, and instrumentation must reasonably ensure that no operating limitations affecting the integrity of high energy rotors will be exceeded in service.

(c) It must be shown by test that equipment containing high energy rotors can contain any failure of a high energy rotor that occurs at the highest speed obtainable with the normal speed control devices inoperative.

(d) Equipment containing high energy rotors must be located where rotor failure will neither endanger the occupants nor adversely affect continued safe flight.

[Amdt. 25-41, 42 FR 36971, July 18, 1977]

### Subpart G—Operating Limitations and Information

#### § 25.1501 General.

(a) Each operating limitation specified in §§ 25.1503 through 25.1533 and other limitations and information necessary for safe operation must be established.

(b) The operating limitations and other information necessary for safe operation must be made available to

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the crewmembers as prescribed in §§ 25.1541 through 25.1587.

[Amdt. 25-42, 43 FR 2323, Jan. 16, 1978]

### OPERATING LIMITATIONS

#### § 25.1503 Airspeed limitations: general.

When airspeed limitations are a function of weight, weight distribution, altitude, or Mach number, limitations corresponding to each critical combination of these factors must be established.

#### § 25.1505 Maximum operating limit speed.

The maximum operating limit speed ( $V_{MO}/M_{MO}$  airspeed or Mach Number, whichever is critical at a particular altitude) is a speed that may not be deliberately exceeded in any regime of flight (climb, cruise, or descent), unless a higher speed is authorized for flight test or pilot training operations.  $V_{MO}/M_{MO}$  must be established so that it is not greater than the design cruising speed  $V_C$  and so that it is sufficiently below  $V_D/M_D$  or  $V_{DF}/M_{DF}$ , to make it highly improbable that the latter speeds will be inadvertently exceeded in operations. The speed margin between  $V_{MO}/M_{MO}$  and  $V_D/M_D$  or  $V_{DF}/M_{DF}$  may not be less than that determined under § 25.335(b) or found necessary during the flight tests conducted under § 25.253.

[Amdt. 25-23, 35 FR 5680, Apr. 8, 1970]

#### § 25.1507 Maneuvering speed.

The maneuvering speed must be established so that it does not exceed the design maneuvering speed  $V_A$  determined under § 25.335(c).

#### § 25.1511 Flap extended speed.

The established flap extended speed  $V_{FE}$  must be established so that it does not exceed the design flap speed  $V_F$  chosen under §§ 25.335(e) and 25.345, for the corresponding flap positions and engine powers.

#### § 25.1513 Minimum control speed.

The minimum control speed  $V_{MC}$  determined under § 25.149 must be established as an operating limitation.

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#### § 25.1515 Landing gear speeds.

(a) The established landing gear operating speed or speeds,  $V_{LO}$ , may not exceed the speed at which it is safe both to extend and to retract the landing gear, as determined under § 25.729 or by flight characteristics. If the extension speed is not the same as the retraction speed, the two speeds must be designated as  $V_{LO(EXT)}$  and  $V_{LO(RET)}$ , respectively.

(b) The established landing gear extended speed  $V_{LE}$  may not exceed the speed at which it is safe to fly with the landing gear secured in the fully extended position, and that determined under § 25.729.

[Doc. No. 5066, 29 FR 18291, Dec. 24, 1964, as amended by Amdt. 25-38, 41 FR 55468, Dec. 20, 1976]

#### § 25.1516 Other speed limitations.

Any other limitation associated with speed must be established.

[Doc. No. 2000-8511, 66 FR 34024, June 26, 2001]

#### § 25.1517 Rough air speed, $V_{RA}$ .

A rough air speed,  $V_{RA}$ , for use as the recommended turbulence penetration airspeed in § 25.1585(a)(8), must be established, which—

(1) Is not greater than the design airspeed for maximum gust intensity, selected for  $V_B$ ; and

(2) Is not less than the minimum value of  $V_B$  specified in § 25.335(d); and

(3) Is sufficiently less than  $V_{MO}$  to ensure that likely speed variation during rough air encounters will not cause the overspeed warning to operate too frequently. In the absence of a rational investigation substantiating the use of other values,  $V_{RA}$  must be less than  $V_{MO}-35$  knots (TAS).

[Doc. No. 27902, 61 FR 5222, Feb. 9, 1996]

#### § 25.1519 Weight, center of gravity, and weight distribution.

The airplane weight, center of gravity, and weight distribution limitations determined under §§ 25.23 through 25.27 must be established as operating limitations.

#### § 25.1521 Powerplant limitations.

(a) *General.* The powerplant limitations prescribed in this section must be