

(2) If two separate combination digital flight data recorder and cockpit voice recorder units are installed instead of one cockpit voice recorder and one digital flight data recorder, the combination unit that is installed to comply with the cockpit voice recorder requirements may be located near the cockpit.

(f) If the cockpit voice recorder has a bulk erasure device, the installation must be designed to minimize the probability of inadvertent operation and actuation of the device during crash impact.

(g) 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 manner that they are not likely to be separated during crash impact.

[Doc. No. 5066, 29 FR 18291, Dec. 24, 1964, as amended by Amdt. 25-2, 30 FR 3932, Mar. 26, 1965; Amdt. 25-16, 32 FR 13914, Oct. 6, 1967; Amdt. 25-41, 42 FR 36971, July 18, 1977; Amdt. 25-65, 53 FR 26143, July 11, 1988; Amdt. 25-124, 73 FR 12563, Mar. 7, 2008; 74 FR 32800, July 9, 2009]

#### § 25.1459 Flight data recorders.

(a) Each flight recorder required by the operating rules of this chapter must be installed so that—

(1) It is supplied with airspeed, altitude, and directional data obtained from sources that meet the accuracy requirements of §§ 25.1323, 25.1325, and 25.1327, as appropriate;

(2) The vertical acceleration sensor is rigidly attached, and located longitudinally either within the approved center of gravity limits of the airplane, or at a distance forward or aft of these limits that does not exceed 25 percent of the airplane's mean aerodynamic chord;

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

(ii) It remains powered for as long as possible without jeopardizing emergency operation of the airplane.

(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;

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

(7) Any single electrical failure external to the recorder does not disable both the cockpit voice recorder and the flight data recorder; and

(8) It is in a separate container from the cockpit voice recorder when both are required. If used to comply with only the flight data recorder requirements, a combination unit may be installed. If a combination unit is installed as a cockpit voice recorder to comply with § 25.1457(e)(2), a combination unit must be used to comply with this flight data recorder requirement.

(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—

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(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; Amdt. 25-124, 73 FR 12563, Mar. 7, 2008; 74 FR 32800, July 9, 2009]

## § 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]

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### 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 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).