

§ 25.27

§ 25.27 Center of gravity limits.

The extreme forward and the extreme aft center of gravity limitations must be established for each practicably separable operating condition. No such limit may lie beyond—

- (a) The extremes selected by the applicant;
- (b) The extremes within which the structure is proven; or
- (c) The extremes within which compliance with each applicable flight requirement is shown.

§ 25.29 Empty weight and corresponding center of gravity.

(a) The empty weight and corresponding center of gravity must be determined by weighing the airplane with—

- (1) Fixed ballast;
 - (2) Unusable fuel determined under § 25.959; and
 - (3) Full operating fluids, including—
 - (i) Oil;
 - (ii) Hydraulic fluid; and
 - (iii) Other fluids required for normal operation of airplane systems, except potable water, lavatory precharge water, and fluids intended for injection in the engine.
- (b) The condition of the airplane at the time of determining empty weight must be one that is well defined and can be easily repeated.

[Doc. No. 5066, 29 FR 18291, Dec. 24, 1964, as amended by Amdt. 25-42, 43 FR 2320, Jan. 16, 1978; Amdt. 25-72, 55 FR 29774, July 20, 1990]

§ 25.31 Removable ballast.

Removable ballast may be used on showing compliance with the flight requirements of this subpart.

§ 25.33 Propeller speed and pitch limits.

(a) The propeller speed and pitch must be limited to values that will ensure—

- (1) Safe operation under normal operating conditions; and
 - (2) Compliance with the performance requirements of §§ 25.101 through 25.125.
- (b) There must be a propeller speed limiting means at the governor. It must limit the maximum possible governed engine speed to a value not exceeding the maximum allowable r.p.m.

(c) The means used to limit the low pitch position of the propeller blades must be set so that the engine does not exceed 103 percent of the maximum allowable engine rpm or 99 percent of an approved maximum overspeed, whichever is greater, with—

- (1) The propeller blades at the low pitch limit and governor inoperative;
- (2) The airplane stationary under standard atmospheric conditions with no wind; and
- (3) The engines operating at the take-off manifold pressure limit for reciprocating engine powered airplanes or the maximum takeoff torque limit for turbopropeller engine-powered airplanes.

[Doc. No. 5066, 29 FR 18291, Dec. 24, 1964, as amended by Amdt. 25-57, 49 FR 6848, Feb. 23, 1984; Amdt. 25-72, 55 FR 29774, July 20, 1990]

PERFORMANCE

§ 25.101 General.

(a) Unless otherwise prescribed, airplanes must meet the applicable performance requirements of this subpart for ambient atmospheric conditions and still air.

(b) The performance, as affected by engine power or thrust, must be based on the following relative humidities;

- (1) For turbine engine powered airplanes, a relative humidity of—
 - (i) 80 percent, at and below standard temperatures; and
 - (ii) 34 percent, at and above standard temperatures plus 50 °F.

Between these two temperatures, the relative humidity must vary linearly.

(2) For reciprocating engine powered airplanes, a relative humidity of 80 percent in a standard atmosphere. Engine power corrections for vapor pressure must be made in accordance with the following table:

| Altitude <i>H</i> (ft.) | Vapor pressure <i>e</i> (In. Hg.) | Specific humidity <i>w</i> (Lb. moisture per lb. dry air) | Density ratio $\rho / \sigma = 0.0023769$ |
|----------------------------|---|---|--|
| 0 | 0.403 | 0.00849 | 0.99508 |
| 1,000 | .354 | .00773 | .96672 |
| 2,000 | .311 | .00703 | .93895 |
| 3,000 | .272 | .00638 | .91178 |
| 4,000 | .238 | .00578 | .88514 |
| 5,000 | .207 | .00523 | .85910 |
| 6,000 | .1805 | .00472 | .83361 |
| 7,000 | .1566 | .00425 | .80870 |
| 8,000 | .1356 | .00382 | .78434 |
| 9,000 | .1172 | .00343 | .76053 |
| 10,000 | .1010 | .00307 | .73722 |
| 15,000 | .0463 | .001710 | .62868 |