

**§ 25.459 Special devices.**

The loading for special devices using aerodynamic surfaces (such as slots, slats and spoilers) must be determined from test data.

[Doc. No. 5066, 29 FR 18291, Dec. 24, 1964, as amended by Amdt. 25-72, 55 FR 29776, July 20, 1990]

## GROUND LOADS

**§ 25.471 General.**

(a) *Loads and equilibrium.* For limit ground loads—

(1) Limit ground loads obtained under this subpart are considered to be external forces applied to the airplane structure; and

(2) In each specified ground load condition, the external loads must be placed in equilibrium with the linear and angular inertia loads in a rational or conservative manner.

(b) *Critical centers of gravity.* The critical centers of gravity within the range for which certification is requested must be selected so that the maximum design loads are obtained in each landing gear element. Fore and aft, vertical, and lateral airplane centers of gravity must be considered. Lateral displacements of the c.g. from the airplane centerline which would result in main gear loads not greater than 103 percent of the critical design load for symmetrical loading conditions may be selected without considering the effects of these lateral c.g. displacements on the loading of the main gear elements, or on the airplane structure provided—

(1) The lateral displacement of the c.g. results from random passenger or cargo disposition within the fuselage or from random unsymmetrical fuel loading or fuel usage; and

(2) Appropriate loading instructions for random disposable loads are included under the provisions of § 25.1583(c)(1) to ensure that the lateral displacement of the center of gravity is maintained within these limits.

(c) *Landing gear dimension data.* Figure 1 of appendix A contains the basic landing gear dimension data.

[Amdt. 25-23, 35 FR 5673, Apr. 8, 1970]

**§ 25.473 Landing load conditions and assumptions.**

(a) For the landing conditions specified in § 25.479 to § 25.485 the airplane is assumed to contact the ground—

(1) In the attitudes defined in § 25.479 and § 25.481;

(2) With a limit descent velocity of 10 fps at the design landing weight (the maximum weight for landing conditions at maximum descent velocity); and

(3) With a limit descent velocity of 6 fps at the design take-off weight (the maximum weight for landing conditions at a reduced descent velocity).

(4) The prescribed descent velocities may be modified if it is shown that the airplane has design features that make it impossible to develop these velocities.

(b) Airplane lift, not exceeding airplane weight, may be assumed unless the presence of systems or procedures significantly affects the lift.

(c) The method of analysis of airplane and landing gear loads must take into account at least the following elements:

(1) Landing gear dynamic characteristics.

(2) Spin-up and springback.

(3) Rigid body response.

(4) Structural dynamic response of the airframe, if significant.

(d) The landing gear dynamic characteristics must be validated by tests as defined in § 25.723(a).

(e) The coefficient of friction between the tires and the ground may be established by considering the effects of skidding velocity and tire pressure. However, this coefficient of friction need not be more than 0.8.

[Amdt. 25-91, 62 FR 40705, July 29, 1997; Amdt. 25-91, 62 FR 45481, Aug. 27, 1997; Amdt. 25-103, 66 FR 27394, May 16, 2001]

**§ 25.477 Landing gear arrangement.**

Sections 25.479 through 25.485 apply to airplanes with conventional arrangements of main and nose gears, or main and tail gears, when normal operating techniques are used.

**§ 25.479 Level landing conditions.**

(a) In the level attitude, the airplane is assumed to contact the ground at forward velocity components, ranging