(c) Trim control systems must be designed to prevent creeping in flight. Trim tab controls must be irreversible unless the tab is appropriately balanced and shown to be free from flutter.

(d) If an irreversible tab control system is used, the part from the tab to the attachment of the irreversible unit to the airplane structure must consist of a rigid connection.

[Doc. No. 5066, 29 FR 18291, Dec. 24, 1964, as amended by Amdt. 25–23, 35 FR 5675, Apr. 8, 1970; Amdt. 25–115, 69 FR 40527, July 2, 2004]

§ 25.679 Control system gust locks.

(a) There must be a device to prevent damage to the control surfaces (including tabs), and to the control system, from gusts striking the airplane while it is on the ground or water. If the device, when engaged, prevents normal operation of the control surfaces by the pilot, it must—

(1) Automatically disengage when the pilot operates the primary flight controls in a normal manner; or

(2) Limit the operation of the airplane so that the pilot receives unmistakable warning at the start of takeoff.

(b) The device must have means to preclude the possibility of it becoming inadvertently engaged in flight.

§ 25.681 Limit load static tests.

(a) Compliance with the limit load requirements of this Part must be shown by tests in which—

(1) The direction of the test loads produces the most severe loading in the control system; and

(2) Each fitting, pulley, and bracket used in attaching the system to the main structure is included.

(b) Compliance must be shown (by analyses or individual load tests) with the special factor requirements for control system joints subject to angular motion.

§ 25.683 Operation tests.

(a) It must be shown by operation tests that when portions of the control system subject to pilot effort loads are loaded to 80 percent of the limit load specified for the system and the powered portions of the control system are loaded to the maximum load expected in normal operation, the system is free from—

(1) Jamming;

(2) Excessive friction; and

(3) Excessive deflection.

(b) It must be shown by analysis and, where necessary, by tests, that in the presence of deflections of the airplane structure due to the separate application of pitch, roll, and yaw limit maneuver loads, the control system, when loaded to obtain these limit loads and operated within its operational range of deflections, can be exercised about all control axes and remain free from—

(1) Jamming;

(2) Excessive friction;

(3) Disconnection; and

(4) Any form of permanent damage.

(c) It must be shown that under vibration loads in the normal flight and ground operating conditions, no hazard can result from interference or contact with adjacent elements.

[Amdt. 25–139, 79 FR 59430, Oct. 2, 2014]

§ 25.685 Control system details.

(a) Each detail of each control system must be designed and installed to prevent jamming, chafing, and interference from cargo, passengers, loose objects, or the freezing of moisture.

(b) There must be means in the cockpit to prevent the entry of foreign objects into places where they would jam the system.

(c) There must be means to prevent the slapping of cables or tubes against other parts.

(d) Sections 25.689 and 25.693 apply to cable systems and joints.

[Doc. No. 5066, 29 FR 18291, Dec. 24, 1964, as amended by Amdt. 25–38, 41 FR 55466, Dec. 20, 1976]

§ 25.689 Cable systems.

(a) Each cable, cable fitting, turnbuckle, splice, and pulley must be approved. In addition—

(1) No cable smaller than ⅛ inch in diameter may be used in the aileron, elevator, or rudder systems; and

(2) Each cable system must be designed so that there will be no hazardous change in cable tension throughout the range of travel under operating conditions and temperature variations.