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(c) Fairleads must be installed so that they do not cause a change in cable direction of more than three degrees.

(d) Clevis pins subject to load or motion and retained only by cotter pins may not be used in the control system.

(e) Turnbuckles must be attached to parts having angular motion in a manner that will positively prevent binding throughout the range of travel.

(f) Tab control cables are not part of the primary control system and may be less than 1/8 inch diameter in airplanes that are safely controllable with the tabs in the most adverse positions.


§23.691 Artificial stall barrier system.

If the function of an artificial stall barrier, for example, stick pusher, is used to show compliance with §23.201(c), the system must comply with the following:

(a) With the system adjusted for operation, the plus and minus airspeeds at which downward pitching control will be provided must be established.

(b) Considering the plus and minus airspeed tolerances established by paragraph (a) of this section, an airspeed must be selected for the activation of the downward pitching control that provides a safe margin above any airspeed at which any unsatisfactory stall characteristics occur.

(c) In addition to the stall warning required §23.07, a warning that is clearly distinguishable to the pilot under all expected flight conditions without requiring the pilot’s attention, must be provided for faults that would prevent the system from providing the required pitching motion.

(d) Each system must be designed so that the artificial stall barrier can be quickly and positively disengaged by the pilots to prevent unwanted downward pitching of the airplane by a quick release (emergency) control that meets the requirements of §23.1329(b).

(e) A preflight check of the complete system must be established and the procedure for this check made available in the Airplane Flight Manual (AFM). Preflight checks that are critical to the safety of the airplane must be included in the limitations section of the AFM.

(f) For those airplanes whose design includes an autopilot system:

(1) A quick release (emergency) control installed in accordance with §23.1329(b) may be used to meet the requirements of paragraph (d), of this section, and

(2) The pitch servo for that system may be used to provide the stall downward pitching motion.

(g) In showing compliance with §23.1309, the system must be evaluated to determine the effect that any announced or unannounced failure may have on the continued safe flight and landing of the airplane and the ability of the crew to cope with any adverse conditions that may result from such failures. This evaluation must consider the hazards that would result from the airplane’s flight characteristics if the system was not provided, and the hazard that may result from unwanted downward pitching motion, which could result from a failure at airspeeds above the selected stall speed.

[Doc. No. 27806, 61 FR 5165, Feb. 9, 1996]

§23.693 Joints.

Control system joints (in push-pull systems) that are subject to angular motion, except those in ball and roller bearing systems, must have a special factor of safety of not less than 3.33 with respect to the ultimate bearing strength of the softest material used as a bearing. This factor may be reduced to 2.0 for joints in cable control systems. For ball or roller bearings, the approved ratings may not be exceeded.

§23.697 Wing flap controls.

(a) Each wing flap control must be designed so that, when the flap has been placed in any position upon which compliance with the performance requirements of this part is based, the flap will not move from that position unless the control is adjusted or is moved by the automatic operation of a flap load limiting device.

(b) The rate of movement of the flaps in response to the operation of the pilot's control or automatic device must give satisfactory flight and performance characteristics under steady or
changing conditions of airspeed, engine 
power, and attitude. 
(c) If compliance with §23.145(b)(3) 
necessitates wing flap retraction to po-
sitions that are not fully retracted, the 
wing flap control lever settings cor-
responding to those positions must be 
positively located such that a definite 
change of direction of movement of the 
lever is necessary to select settings be-
yond those settings.

§ 23.699 Wing flap position indicator. 
There must be a wing flap position 
indicator for—
(a) Flap installations with only the 
retracted and fully extended position, 
unless—
(1) A direct operating mechanism 
provides a sense of “feel” and position 
such as when a mechanical linkage is 
employed; or 
(2) The flap position is readily deter-
mined without seriously detracting 
from other piloting duties under any 
flight condition, day or night; and 
(b) Flap installation with inter-
mediate flap positions if—
(1) Any flap position other than re-
tracted or fully extended is used to 
show compliance with the performance 
requirements of this part; and 
(2) The flap installation does not 
meet the requirements of paragraph 
(a)(1) of this section.

§ 23.701 Flap interconnection. 
(a) The main wing flaps and related 
movable surfaces as a system must—
(1) Be synchronized by a mechanical 
interconnection between the movable 
flap surfaces that is independent of the 
flap drive system; or by an approved 
equivalent means; or 
(2) Be designed so that the occur-
rence of any failure of the flap system 
that would result in an unsafe flight 
characteristic of the airplane is ex-
tremely improbable; or 
(b) The airplane must be shown to 
have safe flight characteristics with 
any combination of extreme positions 
of individual movable surfaces (me-
chanically interconnected surfaces are 
to be considered as a single surface).

(c) If an interconnection is used in 
multiengine airplanes, it must be de-
signed to account for the 
unsummetrical loads resulting from 
flight with the engines on one side of 
the plane of symmetry inoperative and 
the remaining engines at takeoff 
power. For single-engine airplanes, and 
multiengine airplanes with no slip-
stream effects on the flaps, it may be 
assumed that 100 percent of the critical 
air load acts on one side and 70 percent 
on the other.

§ 23.703 Takeoff warning system. 
For all airplanes with a maximum 
weight more than 6,000 pounds and all 
jets, unless it can be shown that a lift 
or longitudinal trim device that affects 
the takeoff performance of the airplane 
would not give an unsafe takeoff con-
figuration when selected out of an ap-
proved takeoff position, a takeoff 
warning system must be installed and 
meet the following requirements:
(a) The system must provide to the 
pilots an aural warning that is auto-
matically activated during the initial 
portion of the takeoff role if the air-
plane is in a configuration that would 
not allow a safe takeoff. The warning 
must continue until—
(1) The configuration is changed to 
allow safe takeoff, or 
(2) Action is taken by the pilot to 
abandon the takeoff roll.
(b) The means used to activate the 
system must function properly for all 
authorized takeoff power settings and 
procedures and throughout the ranges 
of takeoff weights, altitudes, and tem-
peratures for which certification is re-
quested.
(c) For the purpose of this section, an 
unsafe takeoff configuration is the in-
ability to rotate or the inability to pre-
vent an immediate stall after rotation.