

## § 23.397

and to react at the attachments of the control system to the control surface horns.

[Doc. No. 4080, 29 FR 17955, Dec. 18, 1964, as amended by Amdt. 23-7, 34 FR 13089, Aug. 13, 1969]

### § 23.397 Limit control forces and torques.

(a) In the control surface flight loading condition, the airloads on movable surfaces and the corresponding deflections need not exceed those that would result in flight from the application of any pilot force within the ranges specified in paragraph (b) of this section. In applying this criterion, the effects of control system boost and servo-mechanisms, and the effects of tabs must be considered. The automatic pilot effort must be used for design if it alone can produce higher control surface loads than the human pilot.

(b) The limit pilot forces and torques are as follows:

| Control                                  | Maximum forces or torques for design weight, weight equal to or less than 5,000 pounds <sup>1</sup> | Minimum forces or torques <sup>2</sup> |
|--|---|--|
| Aileron:                                 |   |  |
| Stick .....                              | 67 lbs .....  | 40 lbs.                                |
| Wheel <sup>3</sup> .....                 | 50 D in.-lbs. <sup>4</sup> .....  | 40 D in.-lbs. <sup>4</sup>             |
| Elevator:                                |   |  |
| Stick .....                              | 167 lbs .....   | 100 lbs.                               |
| Wheel (symmetrical) .....                | 200 lbs .....   | 100 lbs.                               |
| Wheel (unsymmetrical) <sup>5</sup> ..... | .....   | 100 lbs.                               |
| Rudder .....                             | 200 lbs .....   | 150 lbs.                               |

<sup>1</sup>For design weight (*W*) more than 5,000 pounds, the specified maximum values must be increased linearly with weight to 1.18 times the specified values at a design weight of 12,500 pounds and for commuter category airplanes, the specified values must be increased linearly with weight to 1.35 times the specified values at a design weight of 19,000 pounds.

<sup>2</sup>If the design of any individual set of control systems or surfaces makes these specified minimum forces or torques inapplicable, values corresponding to the present hinge moments obtained under § 23.415, but not less than 0.6 of the specified minimum forces or torques, may be used.

<sup>3</sup>The critical parts of the aileron control system must also be designed for a single tangential force with a limit value of 1.25 times the couple force determined from the above criteria.

<sup>4</sup>D=wheel diameter (inches).

<sup>5</sup>The unsymmetrical force must be applied at one of the normal handgrip points on the control wheel.

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### § 23.399 Dual control system.

(a) Each dual control system must be designed to withstand the force of the pilots operating in opposition, using individual pilot forces not less than the greater of—

(1) 0.75 times those obtained under § 23.395; or

(2) The minimum forces specified in § 23.397(b).

(b) Each dual control system must be designed to withstand the force of the pilots applied together, in the same direction, using individual pilot forces not less than 0.75 times those obtained under § 23.395.

[Doc. No. 27805, 61 FR 5145, Feb. 9, 1996]

### § 23.405 Secondary control system.

Secondary controls, such as wheel brakes, spoilers, and tab controls, must be designed for the maximum forces that a pilot is likely to apply to those controls.

### § 23.407 Trim tab effects.

The effects of trim tabs on the control surface design conditions must be accounted for only where the surface loads are limited by maximum pilot effort. In these cases, the tabs are considered to be deflected in the direction that would assist the pilot. These deflections must correspond to the maximum degree of “out of trim” expected at the speed for the condition under consideration.

### § 23.409 Tabs.

Control surface tabs must be designed for the most severe combination of airspeed and tab deflection likely to be obtained within the flight envelope for any usable loading condition.

### § 23.415 Ground gust conditions.

(a) The control system must be investigated as follows for control surface loads due to ground gusts and taxiing downwind:

(1) If an investigation of the control system for ground gust loads is not required by paragraph (a)(2) of this section, but the applicant elects to design a part of the control system of these loads, these loads need only be carried from control surface horns through the