PILOT CONTROL FORCE LIMITS (SECONDARY CONTROLS)

Control	Limit pilot forces
Miscellaneous:	
*Crank, wheel, or lever ..	((1 + R) / 3) × 50 lbs., but not less than 50 lbs. nor more than 150 lbs. (R = radius). (Applicable to any angle within 20° of plane of control).
Twist	133 in.–lbs.
Push-pull	To be chosen by applicant.

*Limited to flap, tab, stabilizer, spoiler, and landing gear operation controls.

§ 25.407 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, and the deflections are—

(a) For elevator trim tabs, those required to trim the airplane at any point within the positive portion of the pertinent flight envelope in § 25.333(b), except as limited by the stops; and

(b) For aileron and rudder trim tabs, those required to trim the airplane in the critical unsymmetrical power and loading conditions, with appropriate allowance for rigging tolerances.

§ 25.409 Tabs.

(a) *Trim tabs.* Trim tabs must be designed to withstand loads arising from all likely combinations of tab setting, primary control position, and airplane speed (obtainable without exceeding the flight load conditions prescribed for the airplane as a whole), when the effect of the tab is opposed by pilot effort forces up to those specified in § 25.397(b).

(b) *Balancing tabs.* Balancing tabs must be designed for deflections consistent with the primary control surface loading conditions.

(c) *Servo tabs.* Servo tabs must be designed for deflections consistent with the primary control surface loading conditions obtainable within the pilot maneuvering effort, considering possible opposition from the trim tabs.

§ 25.415 Ground gust conditions.

(a) The flight control systems and surfaces must be designed for the limit loads generated when the airplane is subjected to a horizontal 65-knot ground gust from any direction while taxiing and while parked. For airplanes equipped with control system gust locks, the taxiing condition must be evaluated with the controls locked and unlocked, and the parked condition must be evaluated with the controls locked.

(b) The control system and surface loads due to ground gust may be assumed to be static loads, and the hinge moments H must be computed from the formula:

$H = K\ (1/2)\ \rho_o\ V^2\ c\ S$

Where—

K = hinge moment factor for ground gusts derived in paragraph (c) of this section;

ρ_o = density of air at sea level;

V = 65 knots relative to the aircraft;

S = area of the control surface aft of the hinge line;

c = mean aerodynamic chord of the control surface aft of the hinge line.

(c) The hinge moment factor K for ground gusts must be taken from the following table:

Surface	K	Position of controls
(1) Aileron	0.75	Control column locked or lashed in mid-position.
(2) Aileron	*±0.50	Ailerons at full throw.
(3) Elevator	*±0.75	Elevator full down.
(4) Elevator	*±0.75	Elevator full up.
(5) Rudder	0.75	Rudder in neutral.
(6) Rudder	0.75	Rudder at full throw.

*A positive value of K indicates a moment tending to depress the surface, while a negative value of K indicates a moment tending to raise the surface.

(d) The computed hinge moment of paragraph (b) of this section must be used to determine the limit loads due to ground gust conditions for the control surface. A 1.25 factor on the computed hinge moments must be used in calculating limit control system loads.

(e) Where control system flexibility is such that the rate of load application in the ground gust conditions might produce transient stresses appreciably higher than those corresponding to static loads, in the absence of a rational analysis substantiating a different dynamic factor, an additional factor of 1.6 must be applied to the control system loads of paragraph (d) of this section to obtain limit loads. If a