K_g=0.88μ_g/5.3+μ_g=gust alleviation factor;
μ_g=2(W/S)/ρ Cag=airplane mass ratio;
U_{de}=Derived gust velocities referred to in §23.333(c) (f.p.s.);
ρ=Density of air (slugs/cu.ft.);
W/S=Wing loading (p.s.f.) due to the applicable weight of the airplane in the particular load case.
W/S=Wing loading (p.s.f.);
C=Mean geometric chord (ft.);
g=Acceleration due to gravity (ft./sec.^{2})
V=Airplane equivalent speed (knots); and
a=Slope of the airplane normal force coefficient curve C_{NA} per radian if the gust loads are applied to the wings and horizontal tail surfaces simultaneously by a rational method. The wing lift curve slope C_L per radian may be used when the gust load is applied to the wings only and the horizontal tail gust loads are treated as a separate condition.

[Amdt. 23–7, 34 FR 13088, Aug. 13, 1969, as amended by Amdt. 23–42, 56 FR 352, Jan. 3, 1991; Amdt. 23–48, 61 FR 5144, Feb. 9, 1996]

§ 23.343 Design fuel loads.

(a) The disposable load combinations must include each fuel load in the range from zero fuel to the selected maximum fuel load.

(b) If fuel is carried in the wings, the maximum allowable weight of the airplane without any fuel in the wing tank(s) must be established as ''maximum zero wing fuel weight,'' if it is less than the maximum weight.

(c) For commuter category airplanes, a structural reserve fuel condition, not exceeding fuel necessary for 45 minutes of operation at maximum continuous power, may be selected. If a structural reserve fuel condition is selected, it must be used as the minimum fuel weight condition for showing compliance with the flight load requirements prescribed in this part and—

(1) The structure must be designed to withstand a condition of zero fuel in the wing at limit loads corresponding to:

(i) Ninety percent of the maneuvering load factors defined in §23.337, and

(ii) Gust velocities equal to 85 percent of the values prescribed in §23.333(c).

(2) The fatigue evaluation of the structure must account for any increase in operating stresses resulting from the design condition of paragraph (c)(1) of this section.

(3) The flutter, deformation, and vibration requirements must also be met with zero fuel in the wings.

[Doc. No. 27805, 61 FR 5144, Feb. 9, 1996]

§ 23.345 High lift devices.

(a) If flaps or similar high lift devices are to be used for takeoff, approach or landing, the airplane, with the flaps fully extended at V_F, is assumed to be subjected to symmetrical maneuvers and gusts within the range determined by—

(1) Maneuvering, to a positive limit load factor of 2.0; and

(2) Positive and negative gust of 25 feet per second acting normal to the flight path in level flight.

(b) V_F must be assumed to be not less than 1.4 V_S or 1.8 V_{SF}, whichever is greater, where—

(1) V_S is the computed stalling speed with flaps retracted at the design weight; and

(2) V_{SF} is the computed stalling speed with flaps fully extended at the design weight.

(3) If an automatic flap load limiting device is used, the airplane may be designed for the critical combinations of airspeed and flap position allowed by that device.

(c) In determining external loads on the airplane as a whole, thrust, slipstream, and pitching acceleration may be assumed to be zero.

(d) The flaps, their operating mechanism, and their supporting structures, must be designed to withstand the conditions prescribed in paragraph (a) of this section. In addition, with the flaps fully extended at V_F, the following conditions, taken separately, must be accounted for:

(1) A head-on gust having a velocity of 25 feet per second (EAS), combined with propeller slipstream corresponding to 75 percent of maximum continuous power; and

(2) The effects of propeller slipstream corresponding to maximum takeoff power.

[Doc. No. 27805, 61 FR 5144, Feb. 9, 1996]