for the maximum response at the nacelle center of gravity derived from the following dynamic gust conditions applied to the airplane:

(1) A discrete gust determined in accordance with § 25.341(a) at each angle normal to the flight path, and separately,

(2) A pair of discrete gusts, one vertical and one lateral. The length of each of these gusts must be independently tuned to the maximum response in accordance with § 25.341(a). The penetration of the airplane in the combined gust field and the phasing of the vertical and lateral component gusts must be established to develop the maximum response to the gust pair. In the absence of a more rational analysis, the following formula must be used for each of the maximum engine loads in all six degrees of freedom:

$$P_L = P_{L-1g} \pm 0.85\sqrt{L_V^2 + L_L^2}$$

Where—

P_L = limit load;

$P_{L\text{-}1g}$ = steady 1g load for the condition;

L_V = peak incremental response load due to a vertical gust according to § 25.341(a); and

L_L = peak incremental response load due to a lateral gust according to § 25.341(a).

[Doc. No. 27902, 61 FR 5221, Feb. 9, 1996; 61 FR 9533, Mar. 8, 1996; Doc. No. FAA–2013–0142; 79 FR 73467, Dec. 11, 2014; Amdt. 25–141, 80 FR 4762, Jan. 29, 2015; 80 FR 6435, Feb. 5, 2015]

§ 25.343 Design fuel and oil loads.

(a) The disposable load combinations must include each fuel and oil load in the range from zero fuel and oil to the selected maximum fuel and oil load. A structural reserve fuel condition, not exceeding 45 minutes of fuel under the operating conditions in § 25.1001(e) and (f), as applicable, may be selected.

(b) 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 as prescribed in this subpart. In addition—

(1) The structure must be designed for a condition of zero fuel and oil in the wing at limit loads corresponding to—

(i) A maneuvering load factor of + 2.25; and

(ii) The gust and turbulence conditions of § 25.341(a) and (b), but assuming 85% of the gust velocities prescribed in § 25.341(a)(4) and 85% of the turbulence intensities prescribed in § 25.341(b)(3).

(2) Fatigue evaluation of the structure must account for any increase in operating stresses resulting from the design condition of paragraph (b)(1) of this section; and

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

[Doc. No. 5066, 29 FR 18291, Dec. 24, 1964, as amended by Amdt. 25–18, 33 FR 12226, Aug. 30, 1968; Amdt. 25–72, 55 FR 37607, Sept. 12, 1990; Amdt. 25–86, 61 FR 5221, Feb. 9, 1996; Amdt. 25–141, 79 FR 73468, Dec. 11, 2014]

§ 25.345 High lift devices.

(a) If wing flaps are to be used during takeoff, approach, or landing, at the design flap speeds established for these stages of flight under § 25.335(e) and with the wing flaps in the corresponding positions, the airplane is assumed to be subjected to symmetrical maneuvers and gusts. The resulting limit loads must correspond to the conditions determined as follows:

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

(2) Positive and negative gusts of 25 ft/sec EAS acting normal to the flight path in level flight. Gust loads resulting on each part of the structure must be determined by rational analysis. The analysis must take into account the unsteady aerodynamic characteristics and rigid body motions of the aircraft. The shape of the gust must be as described in § 25.341(a)(2) except that—

U_{ds} = 25 ft/sec EAS;

H = 12.5 c; and

c = mean geometric chord of the wing (feet).

(b) The airplane must be designed for the conditions prescribed in paragraph (a) of this section, except that the airplane load factor need not exceed 1.0,