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(2) One-third of the limit load factor for flight condition A.
(b) The side load prescribed in paragraph (a) of this section may be assumed to be independent of other flight conditions.

§ 23.365 Pressurized cabin loads.

For each pressurized compartment, the following apply:
(a) The airplane structure must be strong enough to withstand the flight loads combined with pressure differential loads from zero up to the maximum relief valve setting.
(b) The external pressure distribution in flight, and any stress concentrations, must be accounted for.
(c) If landings may be made with the cabin pressurized, landing loads must be combined with pressure differential loads from zero up to the maximum allowed during landing.
(d) The airplane structure must be strong enough to withstand the pressure differential loads corresponding to the maximum relief valve setting multiplied by a factor of 1.33, omitting other loads.
(e) If a pressurized cabin has two or more compartments separated by bulkheads or a floor, the primary structure must be designed for the effects of sudden release of pressure in any compartment with external doors or windows. This condition must be investigated for the effects of failure of the largest opening in the compartment. The effects of intercompartmental venting may be considered.

§ 23.367 Unsymmetrical loads due to engine failure.

(a) Turbopropeller airplanes must be designed for the unsymmetrical loads resulting from the failure of the critical engine including the following conditions in combination with a single malfunction of the propeller drag limiting system, considering the probable pilot corrective action on the flight controls:
(1) At speeds between $V_{MC}$ and $V_D$, the loads resulting from power failure because of fuel flow interruption are considered to be limit loads.
(2) At speeds between $V_{MC}$ and $V_C$, the loads resulting from the disconnection of the engine compressor from the turbine or from loss of the turbine blades are considered to be ultimate loads.
(3) The time history of the thrust decay and drag buildup occurring as a result of the prescribed engine failures must be substantiated by test or other data applicable to the particular engine-propeller combination.
(b) The external pressure distribution in flight, and any stress concentrations, must be accounted for.
(c) If landings may be made with the cabin pressurized, landing loads must be combined with pressure differential loads from zero up to the maximum allowed during landing.
(d) The airplane structure must be strong enough to withstand the pressure differential loads corresponding to the maximum relief valve setting multiplied by a factor of 1.33, omitting other loads.
(e) If a pressurized cabin has two or more compartments separated by bulkheads or a floor, the primary structure must be designed for the effects of sudden release of pressure in any compartment with external doors or windows. This condition must be investigated for the effects of failure of the largest opening in the compartment. The effects of intercompartmental venting may be considered.

§ 23.369 Rear lift truss.

(a) If a rear lift truss is used, it must be designed to withstand conditions of reversed airflow at a design speed of:

$$V = 8.7 \sqrt{(W/S)} + 8.7 \text{ (knots),}$$

where $W/S =$ wing loading at design maximum takeoff weight.
(b) Either aerodynamic data for the particular wing section used, or a value of $C_L$ equaling $-0.8$ with a chordwise distribution that is triangular between a peak at the trailing edge and zero at the leading edge, must be used.

§ 23.371 Gyroscopic and aerodynamic loads.

(a) Each engine mount and its supporting structure must be designed for the gyroscopic, inertial, and aerodynamic loads that result, with the engine(s) and propeller(s), if applicable, at maximum continuous r.p.m., under either:

1. The conditions prescribed in § 23.351 and § 23.423; or
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(2) All possible combinations of the following—
(i) A yaw velocity of 2.5 radians per second;
(ii) A pitch velocity of 1.0 radian per second;
(iii) A normal load factor of 2.5; and
(iv) Maximum continuous thrust.

(b) For airplanes approved for aero-
batic maneuvers, each engine mount
and its supporting structure must meet
the requirements of paragraph (a) of
this section and be designed to with-
stand the load factors expected during
combined maximum yaw and pitch ve-
locities.

(c) For airplanes certificated in the
commuter category, each engine
mount and its supporting structure
must meet the requirements of para-
graph (a) of this section and the gust
conditions specified in § 23.341 of this
part.

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

§ 23.373 Speed control devices.

If speed control devices (such as
spoilers and drag flaps) are incor-
porated for use in enroute conditions—
(a) The airplane must be designed for
the symmetrical maneuvers and gusts
prescribed in §§ 23.333, 23.337, and 23.341,
and the yawing maneuvers and lateral
gusts in §§ 23.441 and 23.443, with the de-
vice extended at speeds up to the
placard device extended speed; and
(b) If the device has automatic oper-
ating or load limiting features, the air-
plane must be designed for the maneu-
ver and gust conditions prescribed in
paragraph (a) of this section at the
speeds and corresponding device posi-
tions that the mechanism allows.

[Amdt. 23–7, 34 FR 13089, Aug. 13, 1969]

CONTROL SURFACE AND SYSTEM LOADS

§ 23.391 Control surface loads.

The control surface loads specified in
§§ 23.397 through 23.459 are assumed to occur in the conditions described in
§§ 23.331 through 23.351.

[Doc. No. 4080, 29 FR 17995, Dec. 18, 1964, as
amended by Amdt. 23–48, 61 FR 5145, Feb. 9,
1996]

§ 23.393 Loads parallel to hinge line.

(a) Control surfaces and supporting
hinge brackets must be designed to
withstand inertial loads acting parallel
to the hinge line.

(b) In the absence of more rational
data, the inertial loads may be as-
sumed to be equal to KW, where—
(1) K=24 for vertical surfaces;
(2) K=12 for horizontal surfaces; and
(3) W=weight of the movable surfaces.

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

§ 23.395 Control system loads.

(a) Each flight control system and its
supporting structure must be designed
for loads corresponding to at least 125
percent of the computed hinge mo-
ments of the movable control surface
in the conditions prescribed in §§ 23.391
through 23.459. In addition, the fol-
lowing apply:

(1) The system limit loads need not
exceed the higher of the loads that can
be produced by the pilot and automatic
devices operating the controls. How-
ever, autopilot forces need not be added
to pilot forces. The system must be de-
signed for the maximum effort of the
pilot or autopilot, whichever is higher.
In addition, if the pilot and the auto-
pilot act in opposition, the part of the
system between them may be designed
for the maximum effort of the one that
imposes the lesser load. Pilot forces
used for design need not exceed the
maximum forces prescribed in
§ 23.397(b).

(2) The design must, in any case, pro-
vide a rugged system for service use,
considering jamming, ground gusts,
taxing downwind, control inertia, and
friction. Compliance with this subpara-
graph may be shown by designing for
loads resulting from application of the
minimum forces prescribed in
§ 23.397(b).

(b) A 125 percent factor on computed
hinge moments must be used to design
elevator, aileron, and rudder systems.
However, a factor as low as 1.0 may be
used if hinge moments are based on ac-
curate flight test data, the exact reduc-
tion depending upon the accuracy and
reliability of the data.

(c) Pilot forces used for design are as-
sumed to act at the appropriate control
grips or pads as they would in flight,