Civil Air Regulations Amendment 4b-12
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MISCELLANEOUS AMENDMENTS RESULTING FROM FIRST AIRWORTHINESS REVIEW

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PART 4b—AIRPLANE AIRWORTHINESS; TRANSPORT CATEGORIES

Miscellaneous Amendments Resulting From First Airworthiness Review

As a result of the First Federal Aviation Agency Airworthiness Review, the Agency published a notice of proposed rule making affecting several parts of the Civil Air Regulations. This was published in the Federal Register (29 F.R. 5130) and circulated as Civil Air Regulations Draft Release No. 61-12 dated June 8, 1961. There are contained herein amendments to Part 4b of the Civil Air Regulations which stem from this First FAA Airworthiness Review.

Interested persons have been afforded an opportunity to express their comments in regard to the proposal. In some cases the proposal has been modified in accordance with such comments. The more significant amendments being adopted by the Agency are discussed herein.

Several revisions to the flight requirement, § 4b.150, is being expanded to provide pilot control force criteria during phases of unsteady flight and during transition from one flight condition to another. The proposal provides, among other things, that temporary and prolonged force be considered with the airplane trimmed in the prior steady flight condition. Two significant changes have been made to this proposal. The first change permits compliance to be shown in an untrimmed condition when the airplane cannot be trimmed so as not to encroach upon the requirements of § 4b.140 through 4b.144. The second change permits trim during the investigation of the prolonged forces. In conjunction with these changes, the proposed note has been deleted because it does not illustrate the prescribed forces. In addition, § 4b.151 is being amended to prescribe the maximum longitudinal control force applicable to operation with one hand.
lure occupants while in their seats. Fall- 
safe design features may be taken into
account provided possible operational 
and maintenance errors are also con-
sidered.

Section 4b.216(d) presently contains a 
general requirement that the airplane 
be designed for the unsymmetrical loads 
resulting from failure of one engine, e.g., 
yaw loads due to windmil ling drag of a 
turbopropeller engine. On the basis of 
experience gained in design evaluation, 
testing, and operating turbopropeller 
airplanes, § 4b.216(d) is being amended 
to state the factors to be considered in
determining the probability of the types 
of engine failure, corresponding airplane 
goods, malfunctioning of propeller drag 
limiting systems, and pilot corrective 
action.

Section 4b.235 presently contains an 
insufficiency between the drag loads 
specified for this provision in the text 
and the braked roll condition (which may 
be based on the maximum obtainable brake 
torques), and the drag load specified for 
one main gear in the nose wheel yawing 
condition (which is based solely on a 
friiction coefficient of 0.5). Chalk in the 
losses to the nose wheel and supporting 
structure. A drag load corresponding 
with the basic braked roll condition is 
being applied to one main gear as an 
overall airplane condition.

The fatigue evaluation requirements of 
§ 4b.270 at present apply only to struc-
tures supporting flight loads. A number 
of minor provisions in the text have 
been deleted which made the yawing 
loads resulting from the 0.8 co-
efficient to the nose gear and supporting 
structure. A drag load correspond-

ing with the basic braked roll condition is 
being applied to one main gear as an 
overall airplane condition.

The current provisions of § 4b.352 do 
not require full-safe windshields and 
wings on pressurized cabin airplanes; 
however, existing turbine transport 
airplanes are required to have full-
size, full-clearance window areas, and 
these areas are requiring consideration. 
Now, therefore, § 4b.352(d) is being 
amended to require that windshields 
and window panels be made so that the 
outside view is unobstructed. The 
recent amendment differs from that 
presented in that it is less restrictive 
as to the type of window or windshield required.

Sections 4b.307 and 4b.371 require 
that, when louvers or other ventilating 
devices are provided between cabin 
partition walls having a service 
objective which is covered else-
where, §§ 4b.307 and 4b.371 are being 
deleted.

Sections 4b.356(c)(2) and 4b.643 presently 
require an additional factor of safety of 1.33 on the loads for seat and 
safety belt attachments, and § 4b.307(d) requires a factor of 1.15 for structural 
attachments. Sections 4b.558(c)(2) and 4b.643 are being clarified by 
inserting a statement that the 1.15 factor 
may be applied in lieu of the 1.15 factor, 
not be added to it. This is consistent 
with the design philosophy that only 
the greatest of these factors is sufficient. 
A higher factor is intended for a similar 
purpose need be applied. However, if 
castings are used, the casting factor 
specified in § 4b.307(a) still applies, since 
this factor is intended for another 
purpose.

The upper side width specified in 
§ 4b.362(h) has been reduced from 20 to 
18 inches, for airplanes having a pas-
senger seating capacity of 18 or less, on 
the basis of studies indicating that this 
reduction would not adversely affect 
emergency evacuation. However, a fur-
ther reduction of this dimension to 16 
inches, as suggested by several interested 
persons, has not been justified. Bio-
metric data derived from a general 
sampling of the civilian population re-
veals that a significant percentage of 
passengers have a standing bipedal 
exceeding 15 inches, whereas the per-
centage exceeding 16 inches is negligible. 
A 15-inch upper side width, therefore, 
introduces the probability that a single 
passenger may join the aisle between 
seats in the excitement and near-panic 
of an emergency evacuation; and, in any 
event, movement along the aisle would 
be impeded by the outward sideward 
slit which large-lipped passengers must 
assume for passage.

It has been proposed that the optional 
 provision of § 4b.355, which permits the 
control of fire once it has started, would 
be deleted. Paragraph (c) is made on 
that proposal have led to the conclusion 
that such an amendment might be unneces-
sary restrictive and would not be compar-
able with other requirements which 
do permit the control of fire in cargo 
compartments and nacelles. Accord-

ingly, § 4b.412 dealing with pressure 
crossflow lines is being deleted.

As a result of comments received, the 
specific provisions regarding perfor-
ations or tests are being deleted from 
§§ 4b.413 and 4b.416 as they were pro-
ned to be in the draft report. An 
authority for windshields, this 
4b.416, used in connection with the 
selection of unusable fuel supply, are 
more appropriate to the fuel flow section 
in the unusable fuel supply system. 
Presently effective § 4b.416 also 
covers fuel flow rate, relative to transfer 
systems and bases required flow rates on 
horsepower output. Since the changes 
being made to § 4b.416 eliminates the 
horsepower basis for establishing flow 
rate, § 4b.415 is being deleted.

In addition to the matter of unusable 
fuel supply, another question has arisen 
relating to the flow requirements of 
§ 4b.415. Section 4b.415(a) presently 
requirements that the available fuel flow shall 
be not less than 125 percent of that 
developed maximum engine 
horsepower or thrust. The 25 percent 
margin is not required to insure ade-
quate fuel flow. Furthermore, a margin 
is unnecessary to offset system deteriora-
tion because such deterioration is pre-
cluded by proper maintenance, inspec-
tion, and overhaul. Section 4b.413(b) is 
being amended as proposed in accord-
ance with the foregoing.

Section 4b.416 dealing with fuel sys-
tem drains, is being revised to delete 
redundant and contradictory require-
ments.


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Presently effective $4 b.455$ through $4 b.465$ deal with the powerplant cooling capability and specify tests to show that powerplant temperature limits can be maintained. With the exception of $4 b.455$, these sections apply to reciprocating engines. Sections $4 b.430$ through $4 b.450$ are being clarified by making them generally applicable to turbine engine installations as well as reciprocating engine installations and by specifying test conditions which are based on the applicable airplane performance requirements. This clarification is not, however, a change and is being made in $4 b.455$.

Section $4 b.488$ has a fireproof diaphragm to isolate the engine power section and all portions of the exhaust system from the engine accessory compartment, unless equivalent protection can be shown by other means. Fire extinguishing systems are required in all cases to be provided in the engine power section, in the engine accessory section, and in complete powerplant compartments. Since it is considered that fire extinguishing systems are equivalent to a diaphragm in providing protection, there is no reason to retain the paragraphs of $4 b.488$. Accordingly, this section is being deleted. Consistent with this deletion, $4 b.489$ is also being made in $4 b.484$ and $4 b.487$.

Section $4 b.604(q)$ requires a thrust indicator for each turbojet engine. Because such indicators have been used and are being used, another comment expressed concern that since pressure ratio indication has been accepted as meeting the requirement for a different thrust indicator between any two engines, such a meaning was not intended. To prevent the possibility of further misconstruction, the phrase is being deleted. Another comment expressed concern that since pressure ratio indication has been accepted as meeting the requirement for a different thrust indicator, it would necessarily be disallowed in meeting a requirement for indication that thrust changed, the pressure ratio indicator will continue to be acceptable in meeting the amended requirement if it has previously been acceptable in meeting the requirement for a thrust indicator. Since pressure ratio indication might not in all cases fully satisfy the provision that the indicated thrust change results from any engine deficiency, an alternative is being added to the requirement. The alternative will permit the indication of any gas stream pressure which can be related to the thrust output of the engine.

Section $4 b.622(b)$ is being amended by adding two provisions which relate to the proper functioning of the generating system with respect to load equipment. These provisions are a more precise statement of current requirements and are presently effective $4 b.627$ and permit de-leterion of that requirement.

To eliminate an unnecessarily restrictive provision requiring that certain electrical protective devices or their controls be accessible for resets in flight, $4 b.627$ is also being amended by deleting the currently effective rule and adding several provisions to insure the validity of electrical system tests under simulated conditions in the laboratory. The wording in the present section is being deleted because: (1) Other sections require such tests as are necessary to show compliance with all airworthiness requirements, including those dealing with the electrical system; and (2) the need for the provision that the electrical system "functions properly in the event of electrical or thermal distress" has been eliminated by the revision to $4 b.627(b)$.

Presently effective $4 b.662$ deals with the reliability of engine-driven accessories and $4 b.659$ specifies that an airplane must be able to continue safe flight in the event of a failure of a high output power generator, either or both of the accessory systems. These two sections are being deleted because their substance is covered by the provisions of $4 b.660$ which is concerned with the reliability of all equipment, systems, and installations.

Hydraulic system service difficulties have arisen which affect the proposal to add a new $4 b.656$, concerning hydraulics system tests. Therefore, the proposed addition has been deleted and the new test requirement is not being included at this time. A study of the matter is being made outside the framework of this review.

A change is being made to figure 4b-19 dealing with position light intensities in order to remove an irrational discontinuity.

Operating records show an increasing number of cases of exceeding the airspeed operating limits on transport category airplanes, particularly on turbopowered airplanes. Also, the present regulations lack definite criteria for the rational determination of speed margins. Among the probable causes of overspeed are the characteristics of turbopowered airplanes which make it desirable to operate at the limit speed, the somewhat indefinite significance of the present normal operating limit speed, and the increasing preoccupation of pilots with air traffic and other duties which distract them from continuous monitoring of airspeed instruments. Therefore, a series of amendments to the airspeed operating limitations and related requirements is being made.

These amendments replace the existing normal operating limit and never exceed speed (4b.412(b)) by a single speed at the previous normal operating limit value. The new single limit is designated as the "maximum operating limit speed," and is defined in the Airplane Flight Manual (§ 4b.741) as a speed which shall not be deliberately exceeded in any regime of flight, except where a higher speed is authorized for flight test or pilot training operations. The amendments provide a rational method (based on a 1.25 degree dive margin), as well as alternative arbitrary factors, for calculating the speed margin between the new limit speed and the demonstrated flight or structural dive speeds. To provide for atmospheric conditions and other operational factors not covered also require that the variance occur whenever the speed exceeds the limit speed by more than 8 knots or 0.01.

The changes in terminology in the airspeed limitations require corresponding changes, including deletions and additions, in §§ 4b.141, 4b.142, 4b.155, 4b.156, 4b.157, 4b.157-1, 4b.158, 4b.210(b), and 4b.612(b). Also, new administrative changes are being made in §§ 4b.603(a), 4b.612(a), 4b.612(4a), 4b.711, 4b.712, 4b.740-1, and 4b.741(a).

Amendments under these sections and clarifying nature are being made to §§ 4b.1, 4b.11, 4b.155, 4b.156, 4b.221, 4b.306, 4b.390-1, 4b.399-6, 4b.455, 4b.445, 4b.612, 4b.643, 4b.654, 4b.659, 4b.660, 4b.661, and 4b.738. Among the miscellaneous amendments there is one to express the intention of the rule to include such a provision within § 4b.11(b) rather than as a note thereto. Furthermore, the requirement of § 4b.11(b) requiring two complete static air pressure operating systems for the required instruments at the first pilot's station has been withdrawn by the addition of comment received. It has been determined that one such static air pressure operating system is presently required and that this is adequate for the requirement in the interest of safety.
making of this amendment, and due consideration has been given to all relevant matter presented.

In consideration of the foregoing, Part 4b of the Civil Air Regulations (14 CFR Part 4b, as amended) is hereby amended as follows, effective May 3, 1962:

1. By amending §4b.1 by amending paragraphs (a)(2), (d)(9), (d)(10), (d)(15), and (d)(16) to read as follows:

§ 4b.1 Definitions

(a) General design.

(2) Maximum ambient atmospheric temperature. The maximum ambient atmospheric temperature is the temperature selected by the applicant as the maximum operational limit.

(b) Speeds.

(1) Ven, May: The demonstrative flight diving speed at which compliance is shown with the applicable flight requirements. (See §4b.106 and 4b.101(a).)

10. Ven: The design plan speeds for flight loading conditions. (See §4b.110(b)(1)).

15. Vero/Mrc: The maximum speed for stability characteristics. (See §4b.101(b), (c), and (d).)

(16) Vero/Msop: The maximum operating limit speed. (See §4b.110.)

§ 4b.11 [Amendment]

2. By amending §4b.11(b) by inserting in the first sentence between the words “required” and “except” the phrase “notwithstanding the applicant may have been issued a provisional type certificate”.

3. By amending §4b.130 by adding new paragraphs (c), (d), and (e) to read as follows:

§ 4b.130 Controllability; general.

(c) Compliance with the “strength of pilots” limits in paragraph (b) of this section need not be demonstrated unless the aircraft is found to be marginal. In the latter case, the applicant shall not exceed the following pilot control force limits, expressed in pounds:

<table>
<thead>
<tr>
<th>Pitch and Roll Forces</th>
<th>Pitch</th>
<th>Roll</th>
<th>Yaw</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) For temporary applications</td>
<td>75</td>
<td>60</td>
<td>150</td>
</tr>
<tr>
<td>(2) For prolonged applications</td>
<td>60</td>
<td>50</td>
<td>20</td>
</tr>
</tbody>
</table>

Pitch and roll forces shall be measured as applied to the control wheel.

(d) For the purpose of complying with the temporary control force limitations of paragraph (e) of this section, the airplane shall be operated in accordance with approved operating procedure or conventional operating practice including being as nearly trimmed as possible at the prior steady flight condition, except that in the case of takeoffs the airplane shall be trimmed in accordance with approved operating procedures. (c) For the purpose of complying with the prolonged control force limitations of paragraph (e) of this section, the airplane shall be as nearly trimmed as possible.

§ 4b.131 [Amendment]

4. By amending §4b.131(b) by deleting the first sentence and inserting in lieu thereof the following: “During each of the following controllability demonstrations, a change in the trim control shall not be required. In addition, exertion of more than 30 pounds control force, representative of the maximum temporary force which can readily be applied by one hand, shall not be required.”

§ 4b.132 [Amendment]

5. By amending §4b.132(e) by deleting from the last sentence the symbol “Vero” and inserting in lieu thereof “Vero/Mrc”.

§ 4b.141 [Amendment]

6. By amending §4b.141 by deleting the words “Vero or to Mso, whichever is the lesser” and inserting in lieu thereof “Vero/Msop”.

§ 4b.142 [Amendment]

7. By amending §4b.142(c) by deleting the words “Vero or to Mso, whichever is the lesser” and inserting in lieu thereof “Vero/Msop”.

8. By amending §4b.150 to read as follows:

§ 4b.150 General.

The airplane shall be longitudinally, directionally, and laterally stable in accordance with §§4b.151 through 4b.156. Suitable stability shall be required in other conditions normally encountered in service if flight tests show such stability to be necessary for safe operation.

§ 4b.150-1 [Deletion]


10. By amending §4b.151 by amending the introductory paragraphs and paragraphs (a) and (c) to read as follows:

§ 4b.151 Static longitudinal stability.

In the conditions outlined in §§4b.152 through 4b.156, the characteristics of the elevator control forces including friction and the elevator control surface displacement shall comply with paragraphs (a) through (c) of this section.

(a) A pull shall be required to obtain and maintain speeds below the specified trim speed, and a push shall be required to obtain and maintain speeds above the specified trim speed, except that if the elevator control forces are not dependent upon the hinge moments of the elevator control surface it shall also be shown that an upward displacement of the elevator trailing edge is required to obtain and maintain speeds below the specified trim speed and a downward displacement of the elevator trailing edge is required to obtain and maintain speeds above the specified trim speed. These criteria shall apply to any speed which can be obtained, except that such speeds need not be greater than the landing gear or the wing flap operating limit speed or Vero/Mrc, whichever is appropriate or need not be less than the minimum speed in steady uninstalled flight.

(c) The stable slope of the stick force versus speed curve shall not be less than 0.5 pounds per 3 knots nor shall it exceed a value beyond which control of the airplane will be difficult.

§ 4b.151-1 [Deletion]


12. By amending §4b.152 to read as follows:

§ 4b.152 Stability during landing.

The stick force curve and, if required by §4b.151(a), the elevator angle curve shall have stable slopes and the stick force shall not exceed 50 pounds at any speed between 1.1 Ve and 1.5 Ve with:

(a) Wing flaps in the landing position.

(b) The landing gear extended.

(c) Maximum landing weight.

(d) Power, or thrust, off on all engines; and

(e) The airplane trimmed at 1.4 Vso with power or thrust off.

§ 4b.152-1 [Deletion]


14. By amending §4b.153 to read as follows:

§ 4b.153 Stability during approach.

The stick force curve and, if required by §4b.151(a), the elevator angle curve shall have stable slopes at all speeds between 1.1 Ve and 1.5 Ve with:

(a) Wing flap in the approach position.

(b) Landing gear retracted.

(c) Maximum landing weight.

(d) The airplane trimmed at 1.4 V1 with power sufficient to maintain level flight at this speed.

§ 4b.153-1 [Deletion]


16. By amending §4b.154 to read as follows:

§ 4b.154 Stability during climb.

The stick force curve and, if required by §4b.151(a), the elevator angle curve shall have stable slopes at all speeds between 85 and 115 percent of the speed at which the airplane is trimmed with:

(a) Wing flaps retracted.

(b) Landing gear retracted.

(c) Maximum takeoff weight.

(d) 75 percent of maximum continuous power for reciprocating engines; maximum power or thrust selected by the applicant as an operating limitation for use during climb (see §4b.118) for turbine engines; and

(e) The airplane trimmed at the best-rate-of-climb speed except that the speed need not be less than 1.4 V1.

§ 4b.154-1 [Deletion]

17. By deleting §4b.154-1.

18. By amending §4b.155 to read as follows:

§ 4b.155 Stability during cruising.

(a) Landing gear retracted; high speed. The stick force curve and, if required by §4b.151(a), the elevator angle curve shall have stable slopes at all speeds from Vero/Mrc to the speed equal to Vrc(1-1.4 V1) or to 50 knots less than the trim speed specified in subparagraph (e) of this paragraph, whichever
is the lesser speed except that it need not be less than 1.4 \( V_{so} \), and the stick force shall not exceed 50 pounds with:

1. Wing flaps retracted;
2. The most critical weight between maximum landing weight and maximum takeoff weight;
3. 75 percent of maximum continuous power for reciprocating engines; maximum cruising power selected by the applicant as an operating limitation (see § 4b.718) for turbine engines, except that the power need not exceed that required at \( V_{MO/MC} \); and

4. The airplane trimmed for level flight with the power required in subparagraph (2) of this paragraph.

(b) Landing gear retracted; low speed.

The stick force curve and, if required by § 4b.151(a), the elevator angle curve shall have stable slopes at all speeds above 1.4 \( V_{so} \) and the stick force shall not exceed 50 pounds with the wing flaps and weight as specified in paragraph (a) of this section and with:

1. Power required for level flight at a speed equal to \( \frac{V_{TC}-1.4 V_{so}}{2} \) \( V_{so} \); and

2. The airplane trimmed for level flight with the power required in subparagraph (1) of this paragraph.

Note: At altitudes where Mach number is critical, the calibrated airspeed corresponding with \( M_{MC} \) may be used to calculate the speed \( V_{TC} = \frac{V_{TC}-1.4 V_{so}}{2} \).

(c) Landing gear extended. The stick force curve and, if required by § 4b.151(a), the elevator angle curve shall have stable slopes at all speeds above 1.4 \( V_{so} \) and \( V_{MD} \) and the stick force shall not exceed 50 pounds with the wing flaps and the weight as specified in paragraph (a) of this section and with:

1. Power required for level flight at \( V_{MD} \); and

2. The airplane trimmed for level flight with the power required in subparagraph (1) of this paragraph.

§ 4b.155-1 [Deletion]

§ 4b.156 [Amendment]

By amending § 4b.156 by inserting between the words "airplane" and "shall" the parenthetical expression "\( \text{e.g., } V_{TC}, V_{MD}, \text{or } V_{MC/MC} \)".

§ 4b.157 [Amendment]

By amending § 4b.157 by deleting from paragraphs (a) and (b) (1) the words "the operating limit speed" and inserting in lieu thereof the words "\( V_{TC}, V_{MD}, \text{or } V_{MC/MC}, \) whichever is appropriate to the airplane configuration".

§ 4b.157-1 [Amendment]

2. By amending § 4b.157-1 by deleting paragraphs (e) (3), (e) (4), and (f) (2).

§ 4b.158 [Amendment]

By amending § 4b.158 by inserting between the words "airplane" and "shall" the parenthetical expression "\( \text{e.g., } V_{TC}, V_{MD}, \text{or } V_{MC/MC} \)".

§ 4b.159 (b) By deleting the phrase "With trim controls adjusted for straight flight at a speed of 1.4 \( V_{so} \)" and inserting in lieu thereof "With the airplane trimmed for straight flight at the speed prescribed in § 4b.112 (c) (1) (i) (1) of this chapter.

25. By amending § 4b.160 (a) to read as follows:

§ 4b.160 Slowing: symmetrical power.

(c) Straight flight stalls shall be entered with wings level. The roll occurring between the stall and the completion of the recovery shall not exceed approximately 20 degrees.

26. By adding a new § 4b.191 to read as follows:

§ 4b.191 High-speed characteristics.

(a) Speed increase and recovery characteristics.

(1) Operating conditions or characteristics likely to cause inadvertent speed increases, including gusts in pitch and roll, shall be simulated with the airplane as if any likely cruise speed up to \( V_{MO/MC} \). Allowing for pilot reaction time after effective inherent or artificial speed warning occurs (see § 4b.603 (c)), it shall be demonstrated that the airplane can be recovered to a normal attitude and its speed reduced to \( V_{MO/MC} \) without requiring exceptional strength or skill on the part of the pilot, without exceeding \( V_{EB}/M_{EO}, V_{EO}/M_{EO}, \) or the structural limitations, and without producing buffetting which would cause structural damage.

(b) Maximum speed for stability characteristics, \( V_{TC}/M_{TO} \). \( V_{TC}/M_{TO} \) shall be the maximum speed at which the requirements of §§ 4b.132 (e), 4b.135 (a), 4b.157 (a), 4b.157 (b), and 4b.158 are required to be met with flaps and landing gear retracted. It shall not be less than a speed halfway between \( V_{MO/MC} \) and \( V_{MD/MC} \), except that in the altitude range where Mach number is the limiting factor, \( V_{TC} \) need not exceed the Mach number at which effective speed warning occurs.

27. By amending § 4b.210(b) (1) to read as follows:

§ 4b.210 General.

(c) Design air speeds.

(1) Design flap speeds, \( V_{DF} \). The design flap speed for each flap position established in accordance with § 4b.323 (a) shall be sufficiently greater than the operating speed recommended for the corresponding stage of flight (including ballast landing) to allow for probable variations in control of airspeed and for transition from one flap position to another. \( V_{DF} \) shall not be less than:

(i) \( 1.6 V_{so} \) with flaps in takeoff position at maximum takeoff weight;

(ii) \( 1.3 V_{so} \) with flaps in approach position at maximum landing weight; and

(iii) \( 1.8 V_{so} \) with flaps at landing position at maximum landing weight.

Where an automatic flap positioning or load limiting device is employed, it shall be permissible to use the speeds corresponding to the flap positions programmed or permitted by the device. (See § 4b.323 (c) .)

28. By amending § 4b.210(b) (4) by adding at the end thereof the parenthetical reference "(See § 4b.711.)"

29. By amending § 4b.210(b) (5) by reading as follows:

(b) Design air speeds.

(5) Design dive speed, \( V_{d} \). The design dive speed chosen by the applicant shall be used in determining the maximum operating limit speed for the airplane in accordance with § 4b.711.

30. By amending § 4b.212(a) by deleting the introductory paragraph and inserting in lieu thereof the following: "When flaps are intended for use during takeoff, approach, or landing, the airplane shall be assumed to be subjected to symmetrical maneuvers and gusts within the range determined by the following conditions, at the design flap speeds established for those stages of flight in accordance with § 4b.210(b) (1) and with the flaps in the corresponding positions."

31. By amending § 4b.212(b) by deleting from the introductory paragraph the words "\( V_{TC} \) speed established in accordance with § 4b.714(c) \)" and inserting in lieu thereof "the flap design speed chosen for this condition."

32. By amending § 4b.212 by deleting paragraph (d) and amending paragraph (e) to read as follows:

§ 4b.212 Effect of high lift devices.

(c) The airplane shall be designed for the conditions prescribed in paragraph (a) of this section, except that the airplane load factor need not exceed 1.0, taking into account the following effects as separate conditions:

(1) Propeller slipstream corresponding with maximum continuous power at the design flap speeds \( V_{DF} \) and with take-off power at not less than 1.4 times the stalling speed for the particular flap position and associated maximum weight; and

(2) A head-on gust of 25 feet per second velocity (EAS).
(4) Where a pressurized cabin is separate from the cargo or compartmentalized by partitions, bulkheads, or floors, the structure supporting the pressurized flight and ground loads and other structure the failure of which could interfere with continued safe flight and landing of the aircraft, shall be designed to withstand the effects of sudden release of pressure in any compartment through an opening resulting from the failure or penetration of an external door, window, or windshield panel, or from structural fatigue or penetration of the fuselage in such compartment unless it is shown that the probability of failure or penetration is extremely remote. In determining the probability of failure or penetration and probable size of openings, it shall be acceptable to take into account fail-safe features of the design, provided possible improper operation of closure devices and inadvertent door openings are also taken into account. It shall be acceptable to take into account pressure relief provided by intercompartment venting. It can be assumed that parts of the airplane, other than those specified in the certificate, can be damaged, in which case reasonable design precautions shall be taken to minimize the probability of parts becoming detached which may injure occupants while in their seats.

Note: The aforementioned precautions may be, for example, designing internal doors so that they will remain attached to supporting structure even though forced open by a pressure differential.

(d) Unsymmetrical loads due to engine failure. The airplane shall be designed for the unsymmetrical loads resulting from the failure of the critical engine. Turboengine airplanes shall be designed for the conditions prescribed in subparagraphs (1) through (3) of this paragraph in combination with a single malfunction of the propeller drag limiting system (see §4b.400), taking into account the probable pilot corrective action on the flight controls.

(1) At all speeds between \( V_{LS} \) and \( V_{OE} \), the loads resulting from engine power failure due to fuel flow interruption shall be considered as limit loads. At all speeds between \( V_{LS} \) and \( V_{OE} \), the loads resulting from the disconnection of the engine compressor from the turbine or from loss of the turbine blades shall be considered as ultimate loads.

(3) The time history of the thrust decay and drag build-up occurring as a result of the prescribed engine failure shall be substantiated by test or other data applicable to the particular engine-propeller combination.

(4) The timing and magnitude of the probable pilot corrective action shall be conservatively estimated, considering the characteristics of the particular engine-propeller-airplane combination.

Note: It may be assumed that pilot corrected loss of power will be initiated as the time maximum yawing velocity is attained, but not sooner than two seconds after the engine failure. The magnitude of the corrective action may be based on the control forces specified in subparagraph (a)(1), except that lower forces may be assumed where it is shown by analysis or test that such forces will be sufficient to control the yaw and roll resulting from the prescribed engine failure conditions.

34. By amending §4b.221 to read as follows:

§4b.221 Wing flaps.

Wing flaps and their supporting structure and operating mechanisms shall be designed for the critical loads resulting from the conditions prescribed in §4b.212, taking into account the loads occurring during transition from one flap position and airspeed to another.

§4b.235 [Amendment]

35. By amending §4b.235 by deleting from the last sentence of the introductory paragraph the phrase “of paragraph (b)(1) and (2)” and inserting in lieu thereof “paragraphs (b)(1) and (2), and (c)(5)”.

36. By amending §4b.235(e)(2) by adding at the beginning thereof a new sentence to read as follows: “It shall be acceptable to apply the conditions of this subparagraph to the design of only the nose gear, for attaching structure, and the fuselage structure.”

37. By amending §4b.235 by adding a new paragraph (e)(3) to read as follows:

§4b.235 Ground handling conditions.

---

(c) Values contained in MIL-HDBK-6, MIL-HDBK-17, Part I, MIL-HDBK-32 Part II, ANC-18, MIL-HDBK-83 Part I, and ANC-23 Part II shall be used unless shown to be inapplicable in a particular case.


§4b.306-1 [Amendment]

41. By amending §4b.306-1 by deleting from paragraph (a) the expression “ANC-6" and inserting in lieu thereof “MIL-HDBK-84", by deleting from paragraph (c) and the footnote words “The ANC-3 Bulletin" wherever they appear and inserting in lieu thereof “MIL-HDBK-84"; and by deleting from the footnote the phrase "to § 3.11 Design Mechanical Properties" and inserting in lieu thereof "to § 3.11 Material Properties".

42. By amending §4b.307(a) to read as follows:

§4b.307 Special factors.

(a) Casting factors. For structural castings, the factor of safety prescribed in §4b.200 shall be multiplied by the casting factors specified in subparagraphs (1) and (2) of this paragraph. The prescribed tests and inspections shall be in addition to those necessary to establish foundry quality control. Castings shall be inspected in accordance with approved specifications.

Each casting, the failure of which would preclude continued safe flight and landing of the airplane or which would result in serious injury to occupants, shall have a casting factor of at least 1.25 and shall receive 100 percent inspection by visual, radiographic, and magnetic techniques or other non-destructive inspection methods. Where such castings have a casting factor less than 1.50, three sample castings shall be static tested. The test castings shall comply with the strength requirements of §4b.201 at an ultimate load corresponding to a casting factor of 1.25 and shall comply with the deformation
requirements at a load equal to 1.15 times limit load.

Note: Examples of castings to which this sub-subparagraph applies are: structural attachment fittings; parts of flight control systems; control surface hinges and balance weight attachments, seat, berth, safety belt, and fuel and oil tank supports and attachments; cable pressure valves.

(2) For structural castings other than those specified in subparagraph (1) of this paragraph, the casting factors and inspections shall be in accordance with the following table and if there shall be acceptable to reduce the percentage of castings inspected by nonvisual methods when an approved quality control procedure is established. For castings procured to a specification which guarantees the mechanical properties of the material in the castings and provides for demonstration of these properties by test of coupons cut from castings on a sampling basis, it shall be acceptable to use a casting factor of 1.0. The inspection requirements for such castings shall be in accordance with those specified in the following table for casting factors of 1.25 to 1.50, and the testing requirements shall be in accordance with subparagraph (1) of this paragraph.

<table>
<thead>
<tr>
<th>Casting factor</th>
<th>Inspections</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0 or greater</td>
<td>10 percent visual</td>
</tr>
<tr>
<td>Less than 2.0 greater than 1.25</td>
<td>10 percent visual, and mapey of plastic or equivalent nondestructive inspection methods</td>
</tr>
<tr>
<td>1.25 to 1.50</td>
<td>100 percent visual, mapey of plastic, and radiographic, approved nondestructive inspection methods</td>
</tr>
<tr>
<td>1.0 or less</td>
<td>100 percent visual, mapey of plastic, and radiographic, approved nondestructive inspection methods</td>
</tr>
</tbody>
</table>

(3) Castings which are pressure tested as parts of a hydraulic or other fluid system shall not be required to comply with the provisions of this section unless such castings support airplane structural loads.

(4) The casting factor need not exceed 1.25 with regard to bearing stresses regardless of the method of inspection employed. A casting factor need not be exceeded with respect to the bearing surface of a part if the bearing factor used (see paragraph (b) of this section) is greater than the casting factor.

§ 4b.329-2 [Amendment]

49. By amending § 4b.329-2 by deleting from the expression "MIL-C-5424" and inserting in lieu thereof "MIL-W-5424" and by deleting from note 3 the word "Air Force-Navy Aeronautical Design Standard AND 10482" and inserting in lieu thereof "Military Standard Drawing MS33591 (ASG)".

§ 4b.329-6 [Amendment]

44. By amending § 4b.329-6 by deleting the expression "ARC-5" and inserting in lieu thereof "MIL-HDBK-5."
45. By amending § 4b.329-6 by deleting the word "all" and inserting in lieu thereof "one or more."
46. By amending § 4b.329-6 by adding a note at the end of paragraph (e) (1) and by adding a new paragraph (g) to read as follows:

§ 4b.334 Retracting mechanism.

* * *

(1) Position indicator and warning device.

* * *

Notes: An acceptable method for indicating to the pilot when the landing gear is secured in the extended and the retracted positions is by means of lights. For example, lightbeams may display a green light when the landing gear is down and locked; a red light to indicate an intermediate or unlocked landing gear position; and "all lights out" when the landing gear is up and locked. An acceptable method for sensing when the landing gear is retracted is to locate the sensing devices so that they are operated by the landing gear locking latch.

* * *

(2) Protection of equipment in wheel wells. Equipment located in wheel wells which is essential to safe operation of the airplane shall be protected from the damaging effects of a bursting tire unless it is shown that a tire cannot burst from overheating, or from damaging effects of a loose tire tread unless it is shown that a loose tire tread cannot cause damage.

§ 4b.352 [Amendment]

47. By amending § 4b.352 (c) by adding to the end thereof, after the parenthetical expression, two new sentences to read as follows: "Strength shall be provided in the windshield and window panels to withstand the maximum cabin pressure differential, loads (see § 4b.316 (e) (1)) combined with critical aerodynamic pressure and temperature effects, after failure of a single load-carrying element of the window in the extreme position. It shall be acceptable to assume that after a single failure occurs, which is obvious to the flight crew, the cabin pressure differential will be reduced from the maximum in accordance with appropriate operating limitations prescribed in § 4b.202."

§ 4b.357 [Deletion]

48. By deleting § 4b.357.

§ 4b.358 [Amendment]

49. By amending § 4b.358 (c) (2) by adding at the end thereof the words "in lieu of the setting factor prescribed in § 4b.307 (e)."
50. By amending § 4b.362 (b) to read as follows:

§ 4b.362 Emergency evacuation.

(b) Width of main aisle. The main passenger aisle width at any point between seats shall not be less than the values in the following table:

<table>
<thead>
<tr>
<th>Passenger seating capacity</th>
<th>Minimum main passenger aisle width</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 or less</td>
<td>Less than 36 inches from floor</td>
</tr>
<tr>
<td>11 to 19</td>
<td>36 inches minimum from floor</td>
</tr>
<tr>
<td>20 or more</td>
<td>36 inches minimum from floor</td>
</tr>
</tbody>
</table>

Index   Inches |
--------- |
10       |
15       |
20       |
25       |
30       |

§ 4b.371 [Amendment]

51. By deleting § 4b.371 (d).

§ 4b.412 [Deletion]

52. By deleting § 4b.412.

55. By amending § 4b.413 to read as follows:

§ 4b.413 Fuel flow.

(a) The fuel system shall provide not less than 100 percent of the fuel flow required by the engines when the airplane is operated under all intended operating conditions and maneuvers.

(b) In determining compliance with the provisions of paragraph (a) of this section, the provisions of subparagraphs (1) through (4) of this paragraph shall apply.

(1) Fuel shall be delivered to the engine at a pressure within the limits specified in the engine type certificate.

(2) The quantity of fuel in the tank being considered shall not exceed the sum of the amount established as the unusable fuel supply for that tank, as determined in accordance with the provisions of § 4b.416, and whatever minimum quantity of fuel it may be necessary to add to the fuel tank in the interest of determining compliance.

(3) Such main pumps shall be used as are necessary for each operating condition and airplane attitude for which compliance is determined, and, in addition, for each main pump so used, the appropriate emergency pump shall be substituted. (See § 4b.430 (b).)

(4) If a fuel flowmeter is provided, operation of the meter or by-pass in determining compliance with this section and the fuel shall flow through the meter or its bypass.

(5) If an engine can be supplied with fuel from more than one tank, it shall be possible to regain the full fuel pressure of that engine in not more than 20 seconds after switching to any fuel tank when engine malfunctioning becomes apparent due to the depletion of the fuel supply in any tank from which the engine can be fed.

§ 4b.415 [Deletion]

54. By deleting § 4b.415.

§ 4b.416 Unusable fuel supply.

The unusable fuel supply shall be selected by the applicant and shall be established for each tank not less than the quantity at which the first evidence of malfunctioning occurs under the most adverse condition from the standpoint of fuel feed during all intended operations and flight maneuvers involving use of that tank.

§§ 4b.416-1, 4b.416-2 [Deletion]


57. By amending § 4b.418 to read as follows:

§ 4b.418 Flow between interconnected tanks.

If it is possible to pump fuel from one tank to another in flaps, the design of the fuel tank vents and the fuel transfer
system shall be such that no structural damage to tanks will occur in the event of overfilling.
§ 4b.418-1 [Deletion]
58. By deleting § 4b.418-1.
§ 4b.420 [Amendment]
59. By deleting § 4b.420(d).
§ 4b.426-1 [Deletion]
60. By deleting § 4b.426-1.
61. By amending § 4b.435(d) to read as follows:
§ 4b.435 Fuel strainer or filter.

(d) Provision shall be made to maintain automatically the fuel flow when ice-clogging of the filter occurs, unless maintained by fuel strainer drains and other drains as provided in § 4b.424. The drains shall discharge clear of all portions of the airplane and shall incorporate means for positive locking of the drain in the closed position, either manually or automatically.

§ 4b.436 Fuel system drains.

Drainage of the fuel system shall be accomplished by fuel strainer drains and other drains as provided in § 4b.424. The drains shall discharge clear of all portions of the airplane and shall incorporate means for positive locking of the drain in the closed position, either manually or automatically.

§ 4b.441 [Amendment]
62. By deleting § 4b.440(e).

§ 4b.442 [Deletion]
63. By deleting § 4b.442.
64. By amending § 4b.447 to read as follows:
§ 4b.447 Oil filters.

If the powerplant installation incorporates an oil filter (strainer), the filter shall be constructed and installed so that oil will continue to flow at the normal rate through the remainder of the system when the flow of oil through the filter element is completely blocked.

65. By amending § 4b.450 to read as follows:
§ 4b.450 General.

The powerplant cooling provisions shall be capable of maintaining the temperatures of powerplant components and engine fluids within the temperature limits established for such components and fluids, under all surface (ground or water) and flight operating conditions. (For cooling systems instruments see §§ 4b.440(c) and 4b.724.)

§ 4b.450-1 [Deletion]
66. By deleting § 4b.450-1.
67. By amending § 4b.451 to read as follows:
§ 4b.451 Cooling tests.

(a) General. Compliance with the provisions of § 4b.450 shall be demonstrated by test under critical surface (ground or water) and flight operating conditions. If the tests are conducted under conditions which deviate from the maximum ambient atmospheric temperature (see paragraph (b) of this section), the recorded powerplant temperatures shall be corrected in accordance with the provisions of paragraphs (c), (d), (e), and (f) of this section. The corrected temperatures determined in this manner shall not exceed the established limits. In the case of reciprocating engines, the fuel used during the cooling tests shall be of the minimum grade approved for the engine involved, and the mixture settings shall be those normally used in the flight stages for which the cooling tests are conducted. The test procedures shall be as outlined in §§ 4b.453 and 4b.454. (b) Maximum ambient atmospheric temperature. A maximum ambient atmospheric temperature corresponding with sea level conditions shall be established by the applicant as a minimum on the operation of the airplane (see § 4b.718). The temperature lapse rate shall be 3.6°F per thousand feet of altitude above sea level until a temperature of —69°F is reached above which altitude the temperature shall be constant at —69°F.

(c) Correction factor. Temperatures of all powerplant components and engine fluids, except cylinder barrel temperatures, for which temperature limits have been established, shall be corrected by adding the difference between the maximum ambient atmospheric temperature and the temperature of the ambient air at the time of the first occurrence of the maximum component or fluid temperature recorded during the cooling test, unless a more rational correction is shown to be applicable.

(d) Correction factor for cylinder barrel temperatures. Cylinder barrel temperatures shall be corrected by adding 0.7 of the difference between the maximum ambient atmospheric temperature and the temperature of the ambient air at the time of the first occurrence of the maximum cylinder barrel temperature recorded during the cooling test, unless a more rational correction is shown to be applicable.

68. By amending § 4b.452 to read as follows:
§ 4b.452 Cooling test procedures.

(a) General. Compliance with the provisions of § 4b.450 shall be established for the takeoff, climb, cruise, and landing stages of flight which correspond with the applicable performance regulations. The cooling tests shall be conducted with the airplane in the configuration and operating under the conditions which are critical relative to cooling during each stage of flight.

(b) Temperature stabilization. For all stages of flight, temperatures shall be stabilized under conditions from which entry is made into the stage of flight for which a test is conducted, except when the entry condition normally is not one during which component and engine fluid temperatures would stabilize. In such cases, operation through the full entry condition shall be conducted prior to entry into the stage of flight for which the test is conducted in order to allow temperatures to attain their natural level at the time of entry. In particular, the takeoff cooling test shall be preceded by a period during which the powerplant component and engine fluid temperatures are stabilized with the engines at ground idle. A temperature shall be considered stabilized when its rate of change is less than 2 degrees F. per minute.

(c) Duration of test. Cooling tests for each stage of flight shall be continued until one of the following conditions is fulfilled:

(1) Component and engine fluid temperatures stabilize.

(2) The stage of flight is completed;

(3) An operating limitation is reached.

Note: In the case of reciprocating engines, it may be assumed for cooling test purposes that the takeoff stage of flight is complete when the airplane has attained an altitude of 1,500 feet above the takeoff surface or a point in the takeoff where the transition from climb to cruise, if indicated, is complete. The airplane configuration and speed are at the maximum takeoff weight for the airplane and are at the maximum permitted takeoff speed for the airplane.
since permitted for the warning device shall be at a speed not greater than the prescribed warning speed.

91. By amending § 4b.604(a) to read as follows:

§ 4b.604 Powerplant instruments.

(a) An indicator for each turboprop engine to indicate a change in thrust, resulting from any deficiency in the engine or an indicator to indicate a gas stream pressure which can be related to thrust.

§ 4b.612 [Amendment]

62. By amending § 4b.612(a)(3) by deleting the symbol “VNO” and inserting in lieu thereof “VNO”.

§ 4b.612-4 [Amendment]

83. By amending § 4b.612-4(a) by deleting the symbols “V53V” and “VMS” and inserting in lieu thereof “VFC” and “VMS”.

84. By amending § 4b.612(f) to read as follows:

§ 4b.612 Flight and navigational instruments.

(7) Duplicate instrument systems. If duplicate flight instruments are required by the operating parts of the Civil Air Regulations (see note under § 4b.610), the provisions of subparagraphs (1) through (3) of this paragraph shall apply.

(1) The operating system for flight instruments used by the first pilot, which are required to be duplicated at other flight crew stations, shall be completely independent of the operating system provided for other flight crew stations.

(2) Only the required flight instruments and duplicates are connected to other than the first pilot’s operating system, provision shall be made to disconnect or isolate in flight such other instruments.

85. By amending § 4b.623(b) to read as follows:

§ 4b.622 Generating system.

(b) The generating system shall be designed so that:

(1) The power sources function properly when independent and when connected in combination;

(2) The failure or malfunctioning of any power source cannot create a hazard or impair the ability of the remaining sources to supply essential loads;

(3) The system voltage and frequency (as applicable) at the terminals of all essential loads and equipment can be maintained within the limits for which the equipment is designed, during any probable operating condition; and

(4) System transients initiated by switching, fault clearing, or other causes, do not render essential loads inoperative, and do not introduce a smoke or fire hazard.

90. By amending § 4b.624(d) to read as follows:

§ 4b.624 Electrical protection.

(d) If the ability to reset a circuit breaker or to replace a fuse is essential to safety in flight, such circuit breaker or fuse shall be so located and identified that it can be readily reset or replaced in flight.

97. By amending § 4b.627 to read as follows:

§ 4b.627 Electrical system tests.

When laboratory tests of the electrical system are conducted they shall be performed on a mock-up utilizing the same generating equipment complement as in the aircraft. The equipment shall simulate the electrical characteristics of the distribution wiring and connected loads to the extent necessary for valid test results. Laboratory generator drives shall simulate the actual prime movers on the airplane with respect to their effect on generator loading, including loading due to faults. When the conditions of flight cannot adequately be simulated in the laboratory or by ground tests on the prototype airplane, flight tests shall be conducted.

§ 4b.634 [Amendment]

88. By amending Figure 4b-19 referred to in § 4b.634 by deleting the phrase “At least 2 candles” in the intensity column and inserting in lieu thereof “0.05 I.”

§ 4b.642 [Amendment]

89. By amending § 4b.642(a) by deleting the word “danger” and inserting in lieu thereof “probability”.

§ 4b.613 [Amendment]

90. By amending § 4b.643 by adding at the end of the third sentence the words “in lieu of the fitting factor prescribed in § 4b.597(c)”.

§ 4b.645 [Amendment]

91. By amending § 4b.645 by deleting from the introductory paragraph the phrase “through (d)” and inserting in lieu thereof “through (e)”.

§ 4b.652 (Deletion)

92. By deleting § 4b.652.

§ 4b.659 (Deletion)

93. By deleting § 4b.659.

94. By amending § 4b.711 to read as follows:

§ 4b.711 Maximum operating limit speed VNO/MMO.

The maximum operating limit speed is a speed which shall not be deliberately exceeded in any regime of flight (climb, cruise, or descent), except where a higher speed is authorized for flight test or pilot training operations. This operating limitation, denoted by the symbols VNO/MMO (alabed or Mach number, whichever is critical at a particular altitude), shall be established to be not greater than the descending speed Vc and sufficiently below VSO/MO and VY/MO or VY/MO shall be determined in accordance with either paragraph (a) or (b) of this section, but shall not be less than the margin found necessary in flight tests in accordance with § 4b.101. (See also § 4b.603(b) concerning speed warning means.)

The minimum margin shall be the greater of the values determined in accordance with subparagraphs (1) and (2) of this paragraph.

(1) From an initial condition of stabilized flight at VNO/MMO, the airplane shall be assumed to be upset, flown for 20 seconds along a flight path 7.6 degrees below the initial path and pulled up at a lead factor of 1.5 (5g acceleration increment). It shall be acceptable to calculate the speed increase occurring in this maneuver, provided reliable or conservative aerodynamic data are used. The use of the pilot controlled drag devices may be assumed.

(2) The margin shall be sufficient to provide for atmospheric variations, such as instrument errors, and airframe production variations. It shall be acceptable to consider these factors on a probability basis, but the margin at altitudes where MMO is limited by compressibility effects shall not be less than 0.6%.

(b) Vc shall be greater than VSO/MMO.

§ 4b.712 (Deletion)

95. By deleting § 4b.712.

96. By amending § 4b.714 to read as follows:

§ 4b.714 Flap extended speeds, Vfe.

Flap extended speeds, Vfe, shall be established not to exceed the design flap speeds, Vfe, chosen in accordance with §§ 4b.510(b)(1) and 4b.612 for the corresponding flap positions and engine powers.

97. By amending § 4b.718(c) to read as follows:

§ 4b.713 Powerplant limitations.

(c) Fuel grade or specification designation. The minimum fuel grade for reciprocating engines, or the fuel designation for turbine engines, required for the operation of the engine within the limitations prescribed in paragraphs (a) and (b) of this section.

98. By amending § 4b.718 by adding a new paragraph (d) to read as follows:

(d) Maximum ambient atmospheric temperature. The maximum ambient atmospheric temperature at which compliance with the cooling provisions of §§ 4b.450 through 4b.452 is established.

§ 4b.739 [Amendment]

99. By amending § 4b.739(b)(1) by deleting the words “octane number” and inserting in lieu thereof “grade or designation”.

100. By amending § 4b.740—4 by deleting paragraphs (b)(4) (1), (vii), and (viii) to read as follows:
§ 4b.740—1 Preparation of Airplane Flight Manuals for aircraft certificated in the transport category (FAA policies which apply to § 4b.740).

- \( V_{MO}/M_{MO} \). In accordance with § 4b.741,

(a) (1), the manual should include a statement that the maximum operating limit speed shall not be deliberately exceeded in any regime of flight (climb, cruise, or descent), except where a higher speed is authorized for flight test or pilot training operations.

(vii) Compressibility effects. Where a speed limitation (e.g., \( M_{AO} \)) is based on compressibility effects, the manual should include information concerning warning symptoms, probable behavior of the airplane, and recovery procedures.

(viii) Airspeed and Mach indicator markings and placards. An explanation of any markings, limit bands, placards, etc., provided in complying with § 4b.732, should be included.

101. By amending § 4b.741(a) by deleting subparagraph (2) and revising subparagraph (1) to read as follows:

§ 4b.741 Operating limitations.

(a) Airspeed limitations.

(1) The maximum operating limit speed \( V_{AO}/M_{AO} \) (see § 4b.711), together with a statement that this speed limit shall not be deliberately exceeded in any regime of flight (climb, cruise, or descent), except where a higher speed is authorized for flight test or pilot training operations.

Issued in Washington, D.C., on March 27, 1962.

N. E. HALABY,
Administrator.

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