UNITED STATES OF AMERICA
CIVIL AERONAUTICS BOARD
WASHINGTON, D. C.

Civil Air Regulations Amendment 4b-8
Effective: May 16, 1953
Adopted: April 9, 1953

AIRPLANE AIRWORTHINESS - TRANSPORT CATEGORIES

This amendment contains a number of important substantive changes to the Civil Air Regulations.

Section 4b.231 is amended to change the structural provisions concerning level landing conditions. This amendment adds a new level landing condition which takes into account landing gear spring-back loads.

Sections 4b.353, 4b.358, 4b.471, 4b.473, 4b.474, 4b.476, 4b.604, and 4b.611 and Figures 4b-16, 4b-17, and 4b-23 are amended to change the present provisions concerning cockpit standardization. These changes bring the present provisions into general conformity with the standards adopted by the Munitions Board and the Society of Automotive Engineers.

Sections 4b.261, 4b.361, 4b.645, and 4b.646 are amended to change the present provisions for airplane design and equipment installations when airplanes are certificated for ditching. These amendments not only clarify but also expand the requirements by specifying in greater detail the standards relating to the design and installation of ditching equipment. Although these provisions prescribe the type of equipment to be installed, the amount of such equipment to be carried is not specified but may be determined by reference to the operating rules applicable to the number of persons carried and the routes to be flown.

Section 4b.371 is amended to change the design provisions relating to ventilation of the airplane. This change requires that a means be provided for regulating the quantity and temperature of ventilating air in crew compartments independently of the quantity and temperature of the air in other compartments.

Section 4b.418 is amended to change the design provisions relating to fuel flow between interconnected fuel tanks. This amendment requires that fuel tank vents and the fuel transfer system be so designed as to preclude structural damage to the fuel tanks in the event of overfilling.

Sections 4b.401, 4b.484, and 4b.487 are amended to change the powerplant fire protection provisions. These amendments will require newly certificated airplanes to be equipped with both a fire extinguisher system in zone 1 and fireproofed nacelle skin in zone 3. Airplanes manufactured after June 30, 1954, will be required to have fire-resistant lines in the propeller feathering systems and either the fire extinguishing system in zone 1 or fireproof nacelle skin in zone 3.

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Section 4b.604 is amended to change the equipment provisions relating to powerplant instruments. The two amendments to this section require a power indicating device for all engines of 2,000 cu. in. displacement or more and a reverse position indicator for each reversible propeller.

Section 4b.612 is amended to change the provisions relating to the installation of air-speed indicating systems. This amendment requires ground calibration of the air-speed indicator.

Section 4b.632 is amended to change the provisions relating to the installation of the position light system on airplanes. This amendment changes the frequency of flashing position lights from a range of 36 to 60 to a range of 65 to 85 cycles per minute for the purpose of improving conspicuity. In making this change of flashing frequency, it became necessary to change the dual circuit requirement of this section because the change in flashing frequency if used with the present circuits would in effect double the flashing frequency of the rear position lights.

Section 4b.637 is added to the present provisions relating to the installation of anti-collision lights on airplanes. This new section is an optional provision and establishes broad standards for such lights. The section is intended to define the limitations considered desirable for standardization. Since some airplanes have already been equipped with these lights under the authorization of a presently effective Special Civil Air Regulation, it is the intent of this amendment to provide a standard broad enough to encompass substantially all of these existing lights. A new Special Civil Air Regulation is being promulgated simultaneously with this amendment to permit further experimentation, on a limited number of airplanes, with exterior lighting systems which might deviate from the standards contained in this part.

In addition to the foregoing, there are a number of amendments of an editorial and clarifying nature.

Interested persons have been afforded an opportunity to participate in the making of the foregoing amendments, and due consideration has been given to all relevant matter presented.

In addition, section 4b.338 is amended by deleting paragraphs (a) and (b). This change was made for the purpose of deleting extraneous provisions relating to the installation of skis on airplanes. Since the installation provisions of paragraph (a) are now covered in Technical Standard Orders and the test provisions of paragraph (b) are covered by the tests provided in sections 4b.130 through 4b.190, this change is merely for clarity and consistency with other sections.

Sections 4b.117, 4b.170, 4b.231, and 4b.338 are amended for the purpose of interpretation or editorial correction, and notice and public procedure thereon are unnecessary.

In consideration of the foregoing the Civil Aeronautics Board hereby amends Part 4b of the Civil Air Regulations (14 CFR, Part 4b, as amended) effective May 16, 1953:

1. By amending the table of contents by deleting the heading "PERSONNEL AND CARGO ACCOMMODATIONS" immediately preceding § 4b.340 and substituting in lieu thereof the heading "HULLS AND FLOATS".

2. By amending § 4b.1 (a) (3) by adding the following reference: "(See § 4b.18.)".

3. By amending § 4b.1 (f) (5) (i) by deleting the word "or" and substituting in lieu thereof the word "and".

4. By amending § 4b.15 (c) to read as follows:

4b.15 Inspections and tests. * * *

(c) All manufacturing processes, construction, and assembly are as specified in the type design.

5. By amending § 4b.115 by designating the text of the first paragraph as paragraph (a).

6. By amending § 4b.170 (a) by deleting the word "land" and substituting in lieu thereof the word "landing".

7. By amending § 4b.210 by deleting from the first sentence the words "for which certification is desired" and substituting in lieu thereof the words "selected by the applicant".

8. By amending the title of Figure 4b-2 to read as follows: "Maneuvering envelope".

9. By amending the title of Figure 4b-3 to read as follows: "Gust envelope".

10. By amending § 4b.231 (a) by deleting from the second sentence the word "two" and substituting in lieu thereof the word "three".

11. By amending § 4b.231 (a) by adding a new subparagraph (3) to read as follows:

4b.231 Level landing conditions.

(a) General. * * *

(3) Condition of maximum spring-back load. Forward-acting horizontal loads resulting from a rapid reduction of the spin-up drag loads shall be combined with the vertical ground reactions at the instant of the peak forward load. It shall be acceptable to apply this condition only to the landing gear and the directly affected structure.

12. By amending § 4b.231 (b) by deleting the words "subparagraphs (a) (1) and (a) (2)" and substituting in lieu thereof the words "paragraph (a)".

13. By amending § 4b.231 (c) (1) by deleting the second sentence and substituting in lieu thereof the following: "The conditions specified in paragraph (a) of this section shall be investigated."

14. By amending § 4b.231 (c) (2) by deleting the last sentence and substituting in lieu thereof the following: "The conditions specified in paragraph (a) of this section shall be investigated, except that in conditions (a) (1) and (a) (3) it shall be acceptable to investigate the nose and main gear separately neglecting the pitching moments due to wheel spin-up and spring-back loads, while in condition (a) (2) the pitching moment shall be assumed to be resisted by the nose gear."

15. By amending § 4b.261 to read as follows:

4b.261 Structural ditching provisions. (For structural strength considerations of ditching provisions see § 4b.361 (c).)

16. By amending § 4b.306 (c) to read as follows:

4b.306 Material strength properties and design values. * * *

(c) ANC-5, ANC-18, and ANC-23, Part II values shall be used unless shown to be inapplicable in a particular case.

NOTE: ANC-5, "Strength of Metal Aircraft Elements," ANC-18, "Design of Wood Aircraft Structures," and ANC-23, "Sandwich Construction for Aircraft," are published by the Subcommittee on Air Force-Navy-Civil Aircraft Design Criteria, and may be obtained from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

17. By amending § 4b.338 by deleting paragraphs (a) and (b).

18. By amending § 4b.353 (c) by adding the following phrase at the end of the first sentence: "with the seat belt fastened."

19. By amending § 4b.353 (e) to read as follows:

4b.353 Controls. * * *

(e) The wing flap (or auxiliary lift device) and landing gear controls shall comply with the following:

(1) The wing flap control shall be located on top of the pedestal aft of the throttle(s), centrally or to the right of the pedestal centerline and shall be not less than 10 inches aft of the landing gear control.

(2) The landing gear control shall be located to the left of the pedestal centerline.

20. By amending § 4b.353 (f) to read as follows:

4b.353 Controls. * * *

(f) The control knobs shall be shaped in accordance with Figure 4b-22, and such knobs shall be of the same color, but of a color in contrast with that of not only the other control knobs but also the surrounding cockpit.

NOTE: Figure 4b-22 is not intended to indicate the exact size or proportion of the control knobs.

21. By amending Figure 4b-16 by changing the movement and actuation for flaps (or auxiliary lift devices) to read as follows: "Forward for flaps up; rearward for flaps down".

22. By amending Figure 4b-17 by changing the movement and actuation for mixture controls to read as follows: "Forward or upward for rich".

23. By amending Figure 4b-17 by changing the movement and actuation for carburetor air heat to read as follows: "Forward or upward for cold".

24. By amending Figure 4b-17 by adding to the movement and actuation for supercharger controls the following sentence: "In the case of turbo-superchargers, forward, upward, or clockwise to increase pressure."

25. By amending § 4b.358 (b) (1) (ii) by deleting the phrase "in the fore-n-aft direction".

26. By amending § 4b.361 to read as follows:

4b.361 Ditching. Compliance with this section is optional. The requirements of this section are intended to safeguard the occupants in the event of an emergency landing during overwater flight. When

compliance is shown with the provisions of paragraphs (a) through (c) of this section and with the provisions of §§ 4b.362 (d), 4b.645, and 4b.646, the type certificate shall include certification to that effect. When an airplane is certificated to include ditching provisions, the recommended ditching procedures established on the basis of these requirements shall be set forth in the Airplane Flight Manual (see § 4b.742 (d)).

(a) All practicable design measures compatible with the general characteristics of the type airplane shall be taken to minimize the chance of any behavior of the airplane in an emergency landing on water which would be likely to cause immediate injury to the occupants or to make it impossible for them to escape from the airplane. The probable behavior of the airplane in a water landing shall be investigated by model tests or by comparison with airplanes of similar configuration for which the ditching characteristics are known. In this investigation account shall be taken of scoops, flaps, projections, and all other factors likely to affect the hydrodynamic characteristics of the actual airplane.

(b) It shall be shown that under reasonably probable water conditions the flotation time and trim of the airplane will permit all occupants to leave the airplane and to occupy the life rafts required by § 4b.645. If compliance with this provision is shown by buoyancy and trim computations, appropriate allowances shall be made for probable structural damage and leakage.

NOTE: In the case of fuel tanks which are equipped with fuel jettisoning provisions and which can be reasonably expected to withstand a ditching without leakage, the jettisonable volume of fuel may be considered as buoyancy volume.

(c) External doors and windows shall be designed to withstand the probable maximum local pressures, unless the effects of the collapse of such parts are taken into account in the investigation of the probable behavior of the airplane in a water landing as prescribed in paragraphs (a) and (b) of this section.

27. By amending the note to § 4b.371 (a) by deleting the words "A fresh" and substituting in lieu thereof the words "An outside".

28. By amending § 4b.371 by adding a new paragraph (e) to read as follows:

4b.371 Ventilation. * * *

(e) Means shall be provided to enable the crew to control the temperature and quantity of ventilating air supplied to the crew

compartment independently of the temperature and quantity of ventilating air supplied to other compartments.

29. By amending § 4b.303 by adding at the end of paragraph (c) and of subparagraph (b) (1) the following reference: "(See § 4b.380 (c) for protective breathing requirements.)"

30. By amending § 4b.383 (c) by deleting from the first sentence the word "categories" and substituting in lieu thereof the word "classifications".

31. By amending § 4b.386 (c) by deleting the reference "§§ 4b.480 through 4b.490" and substituting in lieu thereof the reference "§§ 4b.480 through 4b.486 and § 4b.489".

32. By amending § 4b.401 (c) by adding in the last sentence after the words "the feathering lines" the phrase "on all airplanes manufactured after June 30, 1954."

33. By amending § 4b.418 by designating the present text as paragraph (a) and adding a new paragraph (b) to read as follows:

4b.418 Flow between interconnected tanks. * * *

(b) If it is possible to pump fuel from one tank to another in flight, the design of the fuel tank vents and the fuel transfer system shall be such that structural damage to tanks will not occur in the event of overfilling.

34. By amending § 4b.453 by deleting the first sentence and inserting in lieu thereof the following: "A take-off cooling test shall be conducted to demonstrate cooling during take-off and during subsequent climb with one engine inoperative."

35. By amending § 4b.471 (c) to read as follows:

4b.471 Throttle and ADI system controls. * * *

(c) If an antidetonant injection system is provided, the flow of ADI fluid shall be automatically controlled in relation to the amount of power produced by the engine. In addition to the automatic control, a separate control shall be provided for the ADI pumps.

36. By amending § 4b.473 (c) to read as follows:

4b.473 Mixture controls. * * *

(c) The mixture controls shall be placed in a location accessible to both pilots, except where a separate flight engineer station with a control panel is provided, in which case the mixture controls shall be accessible to the flight engineer.

37. By amending § 4b.474 (a) (3) to read as follows:

4b.474 Propeller controls. * * *

(a) Propeller speed and pitch controls. * * *

(3) Propeller speed and pitch control(s) shall be placed to the right of the pilot's throttle and shall be at least 1 inch lower than the throttle controls.

38. By amending § 4b.476a to read as follows:

4b.476a Supercharger controls. Supercharger controls shall be accessible to the pilots, except where a separate flight engineer station with a control panel is provided, in which case they shall be accessible to the flight engineer.

39. By amending § 4b.483 to read as follows:

4b.483 Lines and fittings. All lines and fittings carrying flammable fluids or gases in designated fire zones shall comply with the provisions of paragraphs (a) through (c) of this section.

(a) Lines and fittings which are under pressure, or which attach directly to the engine, or which are subject to relative motion between components shall be flexible, fire-resistant lines with fire-resistant end fittings of the permanently attached, detachable, or other approved type. The provisions of this paragraph shall not apply to those lines and fittings which form an integral part of the engine.

(b) Lines and fittings which are not subject to pressure or to relative motion between components shall be of fire-resistant materials.

(c) Vent and drain lines and fittings shall be subject to the provisions of paragraphs (a) and (b), unless a failure of such line or fitting will not result in, or add to, a fire hazard.

40. By amending § 4b.484 (a) (1) to read as follows:

4b.484 Fire extinguisher systems.

(a) General.

(1) Fire extinguisher systems shall be provided to serve all designated fire zones. This requirement shall be effective with respect to applications for type certificates in accordance with the provisions of § 4b.12. In addition, all other airplanes manufactured after June 30, 1954, shall comply with this requirement, unless the engine power section is completely isolated from the engine accessory section by a fireproof diaphragm complying with the provisions of § 4b.488 and unless the cowling and nacelle skin comply with the provisions of § 4b.487, in which case fire extinguisher systems need not be provided in the engine power section.

41. By amending § 4b.484 by deleting subparagraph (a) (3) and making the text of this subparagraph the first sentence of paragraph (e), and by redesignating the present subparagraph (a) (4) as subparagraph (a) (3).

42. By amending § 4b.486 (a) by deleting the word "engine".

43. By amending § 4b.487 by changing the title and by adding a new paragraph (e) to read as follows:

4b.487 Cowling and nacelle skin. * * *

(e) The airplane shall be so designed and constructed that fire originating in the engine power or accessory sections cannot enter, either through openings or by burning through external skin, into any other zone of the nacelle where such fire would create additional hazards. If the airplane is provided with a retractable landing gear, this provision shall apply with the landing gear retracted. Fireproof materials shall be used for all nacelle skin areas which might be subjected to flame in the event of a fire originating in the engine power or accessory sections.

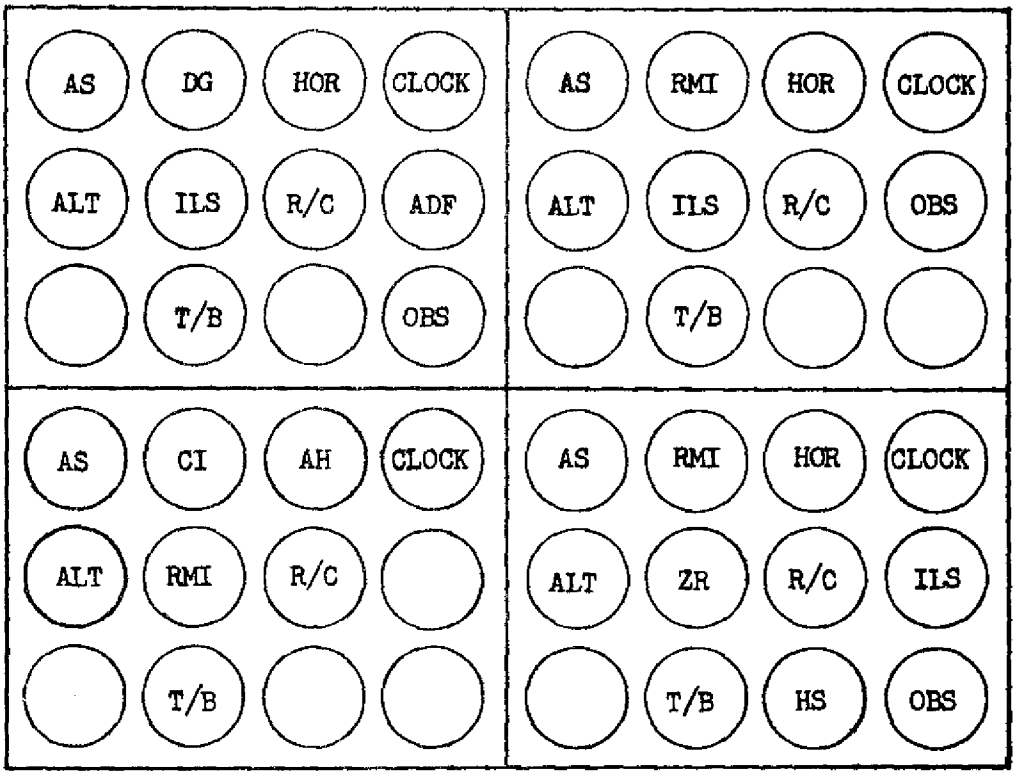
44. By amending § 4b.604 (n) by adding the following clause at the end of the paragraph: "or if the total engine cylinder displacement is 2,000 cubic inches or more."

45. By amending § 4b.604 by adding a new paragraph (n) to read as follows:

4b.604 Powerplant instruments. * * *

(n) A means for each reversing propeller to indicate to the pilot when the propeller is in reverse pitch.

46. By amending Figure 4b-23 to read as follows:



ADF - Automatic direction finder.

AH - Approach horizon.

ALT - Altimeter.

AS - Air speed.

CI - Course indicator.

DG - Direction gyro.

HOR - Artificial horizon (bank and pitch).

HS - Heading selector.

ILS - Instrument landing system.

OBS - Omni-bearing selector.

R/C - Rate of climb.

RMI - Radio magnetic indicator.

T/B - Turn and bank.

ZR - Zero reader.

FIGURE 4b-23 - BASIC FLIGHT INSTRUMENT PANEL ARRANGEMENT

47. By amending § 4b.611 (b) to read as follows:

4b.611 Arrangement and visibility of instrument installations. * * *

(b) Flight instruments required by § 4b.603 shall be grouped in accordance with one of the flight instrument panels in Figure 4b-23 dependent upon which instruments are installed. The panel shall be centered as nearly as practicable about the vertical plane of the pilot's forward vision. The required flight instruments not shown in Figure 4b-23 shall be placed adjacent to the prescribed grouping.

48. By amending § 4b.612 (a) (2) to read as follows:

4b.612 Flight and navigational instruments.

(a) Air-speed indicating systems. * * *

(2) The air-speed indicating system shall be calibrated to determine the system error, i.e., the relation between IAS and CAS, in flight and during the accelerated take-off ground run. The ground run calibration shall be obtained from 0.8 of the minimum value of V_1 to the maximum value of V_2, taking into account the approved altitude and weight range for the airplane. In the ground run calibration, the flap and power settings shall correspond with the values determined in the establishment of the take-off path under the provisions of § 4b.116, assuming the critical engine to fail at the minimum approved value of V_1.

49. By amending § 4b.632 (a) by deleting from the second sentence the phrase, "shall be of the dual circuit type and", and by deleting the words "paragraphs (b) through (g)" and substituting in lieu thereof the words, "paragraphs (b) through (f)".

50. By amending § 4b.632 (c) to read as follows:

4b.632 Position light system installation. * * *

(c) Flasher. A position light flasher of an approved type shall be installed and shall comply with subparagraphs (1) through (3) of this paragraph.

(1) The forward position lights and the fuselage lights shall flash simultaneously at a rate of not less than 65 and not more than 85 flashes per minute.

(2) The rear position lights shall be energized alternately, such that the red light flashes during one flash of the forward position lights and the fuselage lights, and the white light flashes during the next flash of the forward position lights and the fuselage lights.

(3) A switch shall be provided in the system to disconnect the flasher from the circuit so that continuous light can be supplied by the forward position lights and the white rear position light with the remaining lights unenergized.

51. By amending § 4b.632 by deleting paragraph (f) and redesignating the present text of paragraph (g) as paragraph (f).

52. By adding a new § 4b.637 to read as follows:

4b.637 Anti-collision light. If an anti-collision light is used, it shall be of the rotating beacon type installed on top of the fuselage or tail in such a location that the light would not be detrimental to the crew's vision and would not detract from the conspicuity of the position lights. The color of the anti-collision light shall be aviation red in accordance with the specifications of § 4b.635 (a). The arrangement of the anti-collision light, i.e., number of light sources, beam width, speed of rotation, etc., shall be such as to give an effective flash frequency of not less than 40 and not more than 100 cycles per minute, with an on-off ratio not less than 1:75. If an anti-collision light is used, it shall be permissible to install the position lights in a manner so that the forward position lights and the rear white position light are on steady while the fuselage lights and the rear red position light are not energized.

NOTE: An on-off ratio of not less than 1:75 is equivalent to a total angular light beam width of not less than approximately 5 degrees.

53. By amending § 4b.643 by deleting the first sentence and substituting in lieu thereof the following: "Safety belts shall be of an approved type."

54. By amending § 4b.645 to read as follows:

4b.645 Ditching equipment. When the airplane is certificated for ditching in accordance with § 4b.361, and when required by the operating rules for the particular route to be flown, the ditching equipment shall be as prescribed in paragraphs (a) through (d) of this section.

(a) Life rafts. Life rafts shall be of an approved type. Unless excess rafts of sufficient capacity are provided, the buoyancy and seating capacity beyond the rated capacity of the rafts shall be such as to accommodate all occupants of the airplane in the event of a loss of one life raft of the largest rated capacity on board. Each life raft shall be equipped with a trailing line and with a static line, the latter designed to hold the raft near the airplane but to release it in case the airplane becomes totally submerged. Each raft shall contain obvious markings of instruction on the operation of the raft.

(b) Life raft equipment. Approved equipment intended for survival shall be attached to each life raft and marked for identification and method of operation.

NOTE: The extent and type of survival equipment will depend upon the route over which the airplane is operated.

(c) Long-range signalling device. An approved long-range signalling device shall be provided for use in one of the life rafts.

(d) Life preservers. Life preservers shall be of an approved type. They shall be reversible and shall contain obvious markings of instruction on their use.

55. By amending § 4b.646 to read as follows:

4b.646 Stowage of safety equipment. Special stowage provisions shall be made for all prescribed safety equipment to be used in emergencies. The stowage provision shall be such that the equipment is directly accessible and its location is obvious. All safety equipment shall be protected against inadvertent damage. The stowage provisions shall be marked conspicuously to identify the contents and to facilitate removal of the equipment. In addition, the following shall specifically apply.

(a) Emergency exit means. The stowage provisions for the emergency exit means required by § 4b.362 (e) (7) shall be located at the exits which they are intended to serve.

(b) Life rafts. The provisions for the stowage of life rafts required by § 4b.645 (a) shall accommodate a sufficient number of rafts for the maximum number of occupants for which the airplane is certificated for ditching. Stowage shall be near exits through which the rafts can be launched during an unplanned ditching. Rafts automatically or remotely released on the outside of the airplane shall be attached to the airplane by means of the static line prescribed in § 4b.645 (a).

(c) Long-range signalling device. The stowage provisions for the long-range signalling device required by § 4b.645 (c) shall be located near an exit to be available during an unplanned ditching.

(d) Life preservers. The provisions for the stowage of life preservers required by § 4b.645 (d) shall accommodate one life preserver for each occupant for which the airplane is certificated for ditching. They shall be located so that a life preserver is within easy reach of each occupant while seated.

56. By amending § 4b.651 (h) to read as follows:

4b.651 Oxygen equipment and supply. * * *

(h) Protective breathing system. When protective breathing equipment is required by the Civil Air Regulations, it shall be designed to protect the flight crew from the effects of smoke, carbon dioxide, and other harmful gases while on flight deck duty and while combating fires in cargo compartments (see § 4b.380 (c)). The protective breathing equipment and the necessary supply of oxygen shall be in accordance with the following provisions.

(1) The protective breathing equipment shall include masks covering the eyes, nose, and mouth, or only the nose and mouth where accessory equipment is provided to protect the eyes.

(2) A supply of protective oxygen per crew member shall be of 15-minute duration at a pressure altitude of 8,000 feet and a respiratory minute volume of 30 liters per minute BTPD.

NOTE: When a demand type oxygen system is employed, a supply of 300 liters of free oxygen at 70° F. and 760 mm Hg. pressure is considered to be of 15-minute duration at the prescribed altitude and minute volume. When a continuous flow protective breathing system is used, including a mask with a standard rebreather bag, a flow rate of 60 liters per minute at 8,000 feet (45 liters per minute at sea level) and a supply of 600 liters of free oxygen at 70° F. and 760 mm Hg. pressure is considered to be of 15-minute duration at prescribed altitude and minute volume. (BTPD refers to body temperature conditions, i.e., 37° C., at ambient pressure, dry.)

57. By amending § 4b.719 by changing the title and the first sentence to read as follows:

4b.719 Airplane weight, center of gravity, and weight distribution limitations. The airplane weight, center of gravity, and weight distribution limitations shall be those prescribed in §§ 4b.101, 4b.102, and 4b.103. * * *

(Sec. 205 (a), 52 Stat. 984; 49 U.S.C. 425 (a). Interpret or apply secs. 601, 603, 52 Stat. 1007, 1009, as amended; 49 U.S.C. 551, 553)

By the Civil Aeronautics Board:

/s/ M. C. Mulligan

M. C. Mulligan
Secretary

(SEAL)

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