THE UNITED STATES OF AMERICA
CIVIL AERONAUTICS AUTHORITY
WASHINGTON, D.C.

At a session of the Civil Aeronautics Authority
held at its office in Washington, D. C.
on the 15th day of May, 1940.

Acting pursuant to the authority vested in it by the Civil Aeronautics Act of 1938, particularly sections 205(a), 601(a) and 603 of said Act, and finding that its action is desirable in the public interest and is necessary to carry out the provisions of and to exercise and perform its powers and duties under said Act, the Civil Aeronautics Authority hereby amends the Civil Air Regulations as follows:

AMENDMENT NO.48 OF THE CIVIL AIR REGULATIONS	SCOPE, TESTS, DATA, DRAWINGS AND TECHNICAL REQUIREMENTS RESPECTING AIRPLANE AIRWORTHINESS

Effective July 1, 1940, Part 04, as amended, of the Civil Air Regulations is amended as follows:

1. By striking from the table of contents the section titles of 04.01 to 04.06 inclusive and inserting in lieu thereof the following:

"04.01 (Unassigned)

04.02 Airworthiness Certificate

04.03 Data Required

04.04 Inspection and Tests

04.05 Procedure for Type Certification

04.06 Changes"

2. Section 04.0 is amended to read as follows:

"04.0 General.

04.00 Scope. The airworthiness requirements set forth in this Part shall be used as a basis for obtaining airworthiness or type certificates: Provided, That (1) deviations from these requirements which, in the opinion of the Authority, insure the equivalent condition for safe operation and, (2) equivalent requirements of the United States Army or Navy with respect to airworthiness, may be accepted in lieu of the requirements set forth in this Part. Unless otherwise specified an amendment to this Part will apply only to airplanes for which applications for type certificates are received subsequent to the effective date of such amendment.

04.01 (Unassigned)

04.02 Airworthiness certificate. The airworthiness requirements specified hereinafter shall be used as a basis for the certification of airplanes: Provided, That an airplane manufactured in accordance with, and conforming to, the currently effective aircraft specifications issued therefor, will be eligible for an airworthiness certificate if the Authority determines such airplane is in condition for safe operation: Provided, further, That an airplane which has not demonstrated compliance with the airworthiness requirements specified hereinafter but which, in the opinion of the Authority, is in condition for safe operation for experimental purposes or for particular activities, will be eligible for an airworthiness certificate.

04.03 Data required.

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04.030 Unassigned.

04.031 Data required for airworthiness certificate. When an airworthiness certificate is sought and a type certificate is not involved, data which are adequate to establish compliance of the aircraft with the requirements listed hereinafter shall be submitted to the Authority.

04.032 Data required for type certificate. Data which are adequate to establish compliance of the aircraft with the airworthiness requirements listed hereinafter and which are adequate for the reproduction of other airplanes of the same type shall be submitted to the Authority. The procedure for submitting the required data, the technical contents of such data, and the methods of testing aircraft with respect to the prescribed airworthiness requirements shall be in accordance with Civil Aeronautics Authority Manual 04, Airplane Airworthiness.

04.04 Inspection and tests. Authorized representatives of the Authority shall have access to the airplane and may witness or conduct such inspections and tests as are deemed necessary by the Authority. Prior to, or at the time of, presentation of the airplane for official flight tests, the applicant for an airworthiness or type certificate shall submit to the Authority a detailed report of pertinent flight tests conducted, and satisfactory proof of conformity of the airplane with the technical data submitted to the Authority.

04.05 Procedure for type certification. Acceptable procedures for type certification are outlined in Civil Aeronautics Authority Manual 04.

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04.06 Changes. Changes to certificated aircraft shall be substantiated to demonstrate continued compliance of the aircraft with the pertinent airworthiness requirements.

04.060 Minor changes. Minor changes to airplanes being manufactured under the terms of a type certificate and which obviously do not impair the condition of the airplane for safe operation may be approved by authorized representatives of the Authority prior to submittal to the Authority of any required revised drawings. The approval of such minor changes shall be based on the airworthiness requirements in effect when the particular airplane model was originally certificated, unless, in the opinion of the Authority, compliance with current airworthiness requirements is necessary.

04.061 Major changes. Major changes to airplanes being manufactured under the terms of a type certificate may require the issuance of a new type certificate and the Authority may, in its discretion, require such changes to comply with current airworthiness requirements.

04.062 Changes required by the Authority. In the case of aircraft models approved under the airworthiness requirements in effect prior to the currently effective regulations, the Authority may require that aircraft submitted for original airworthiness certification comply with such portions of the currently effective regulations as are considered necessary."

3. Section 04.2121 is amended to read as follows:

"04.2121 Gust load factors. The gust load factors shall be computed on the basis of a gust of the magnitude specified, acting normal to the flight path, and proper allowance shall be made for the effects

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of aspect ratio on the slope of the lift curve. The gust velocities specified shall be used only in conjunction with the gust formulae specified in Civil Aeronautics Authority Manual 04.2121."

4. Section 04.2133(d) is amended to read as follows:

"04.2133(d) C_M = actual value corresponding to $C_{N_{III}}$."

5. Section 04.21330 is amended to read as follows:

"04.21330 Condition III$_1$ (positive low angle of attack, modified). If the moment coefficient of the airfoil section at zero lift has a positive value, or a negative value smaller than 0.06, the effects of displaced ailerons on the moment coefficient shall be accounted for in Condition III for that portion of the span incorporating ailerons. To cover this point it will be satisfactory to combine 75 percent of the loads acting in Condition III with the loads due to a moment coefficient of $-0.08 - C_{M_{III}}$ acting over that portion only of the span incorporating ailerons. The design dynamic pressure for the additional moment forces shall be equal to $0.75q_g$. Only the wings and wing bracing need be investigated for this condition."

6. Section 04.2134(d) is amended to read as follows:

"04.2134(d) C_M = actual value corresponding to $C_{N_{IV}}$."

7. Section 04.2136(c) is amended to read as follows:

"04.2136(c) C_M = actual value corresponding to $C_{N_{VI}}$."

8. Section 04.2141(b) is amended to read as follows:

"04.2141(b) The magnitude and distribution of normal, chord and moment forces over the wing shall correspond to that which would be obtained in developing the specified limit gust load factor at the specified airspeed."

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9. Section 04.2142(b) is amended to read as follows:

"04.2142(b) The magnitude and distribution of normal, chord and moment forces over the wing shall correspond to that which would be obtained in encountering the specified limit gust load factor at the specified airspeed."

10. Section 04.2150 is amended to read as follows:

"04.2150 General. In the following unsymmetrical flight conditions, the unbalanced rolling moment shall be assumed to be resisted by the angular inertia of the complete airplane. See Civil Aeronautics Authority Manual 04.2150 for an acceptable alternative procedure."

11. Section 04.2151 is amended to read as follows:

"04.2151 Condition I_u. Condition I (§04.2131) shall be modified by assuming 100 percent of the air load acting on one wing and 40 percent on the other. For airplanes over 1000 pounds standard weight the latter factor may be increased linearly with standard weight up to 80 percent at 25,000 pounds."

12. Section 04.2152 is amended to read as follows:

"04.2152 Condition III_u. Condition III (§04.2133) shall be modified as described for Condition I_u in §04.2151."

13. Section 04.2210 is amended to read as follows:

"04.2210 Balancing. The limit load acting on the horizontal tail surface shall not be less than the maximum balancing load obtained from ConditionsI, II, III, IV, VII and VIII. In computing these loads for tail surface design the moments of fuselage and nacelles shall be suitably accounted for. The factors given in Table 04-3 shall be used, with the following provisions:

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(a) For Conditions I, II, III and IV, P (in Fig. 04-4) = 40% of net balancing load. (This means that the load on the fixed surface should be 140% of the net balancing load.) In any case P need not exceed that corresponding to a limit elevator control force of 150 pounds, applied by the pilot.

(b) For Conditions VII and VIII, P may be assumed equal to zero."

14. Section 04.2211 is amended to read as follows:

"04.2211 Maneuvering (horizontal surfaces). The factors and distributions specified in Table 04-3 and Fig. 04-5 for this condition shall be used, together with the following provisions:

(a) The limit unit loading in either direction need not exceed that corresponding to a 200 pound force on the elevator control (see Table 04-6).

(b) The average limit unit loading shall not be less than 15 pounds per square foot (see Table 04-3)."

15. Section 04.2213 is amended to read as follows:

"04.2213 Tab effects (horizontal surfaces). When a tab is installed so that it can be used by the pilot as a trimming or assisting device, a limit up load over the tab corresponding to the dynamic pressure at V_L and the maximum tab deflection shall be assumed to act in conjunction with the limit down load specified in §04.2211, disregarding the provisions of §04.2211(a), applied over the remaining area. If the control force necessary to balance the resulting loads on the elevator and tab exceeds 200 pounds (Table 04-6), the loadings over the areas not covered by the tab may be reduced until the control force is equal to this maximum limit value."

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16. Strike sections 04.254, 04.255 and 04.256 and insert the following in lieu thereof:

"04.254 Boat seaplanes.

04.2540 Local bottom pressures.

(a) Maximum local pressure. The maximum value of the limit local pressure shall be determined from the following equation:

$$P_{max} = 0.055\ V_S^{1.4}\ \left(1 + \frac{W}{50,000}\right)^{1/4}, \text{ where}$$

p = pressure, pounds per square inch

V_S = stalling speed, flaps down, power on, in miles per hour. (To be calculated on the basis of wind tunnel data or flight tests on previous airplanes.)

W = design weight

The minimum ultimate factor of safety shall be 1.5.

(b) Variation in local pressure. The local pressures to be applied to the hull bottom shall vary in accordance with Figure 04-11. No variation from keel to chine (beamwise) shall be assumed, except when the chine flare indicates the advisability of higher pressures of the chine.

(c) Application of local pressure. The local pressures determined from §04.2540(a) and Figure 04-11 shall be applied over a local area in such a manner as to cause the maximum local loads in the hull bottom structure.

04.2541 Distributed bottom pressures.

(a) For the purpose of designing frames, keels and chine structure, the limit pressures obtained from §04.2540(a) and Figure 04-11 shall be reduced to one-half the "local" values and simultaneously

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applied over the entire hull bottom. The loads so obtained shall be carried into the side-wall structure of the hull proper, but need not be transmitted in a fore-and-aft direction as shear and bending loads. The minimum ultimate factor of safety shall be 1.5.

(b) Unsymmetrical loading. Each floor member or frame shall be designed for a load on one side of the hull centerline equal to the most critical symmetrical loading, combined with a load on the other side of the hull centerline equal to 1/2 of the most critical symmetrical loading.

04.2542 Step loading condition.

(a) Application of load. The resultant water load shall be applied vertically in the plane of symmetry so as to pass through the center of gravity of the airplane (in full load condition).

(b) Acceleration. The limit acceleration shall be 4.33.

(c) Hull shear and bending loads. The hull shear and bending loads shall be computed from the inertia loads produced by the vertical water load. To avoid excessive local shear loads and bending moments near the point of water load application, the water load may be distributed over the hull bottom, using pressures not less than those specified in §04.2541(a). The minimum ultimate factor of safety shall be 1.5.

04.2543 Bow loading condition.

(a) Application of load. The resultant water load shall be applied in the plane of symmetry at a point one-tenth of the distance from the bow to the step and shall be directed upward and rearward at an angle of 30 degrees from the vertical.

(b) Magnitude of load. The magnitude of the limit resultant water load shall be determined from the following equation:

$P_b = 1/2\ n_s\ W_e$, where

P_b is the load in pounds,

n_s is the step landing load factor,

W_e is an effective weight which is assumed equal to 1/2 the design weight of the airplane.

(c) Hull shear and bending loads. The hull shear and bending loads shall be determined by proper consideration of the inertia loads which resist the linear and angular accelerations involved. To avoid excessive local shear loads, the water reaction may be distributed over the hull bottom, using pressures not less than those specified in §04.2541(a). The minimum ultimate factor of safety shall be 1.5.

04.2544 Stern loading condition.

(a) Application of load. The resultant water load shall be applied vertically in the plane of symmetry and shall be distributed over the hull bottom from the second step forward with an intensity equal to the pressures specified in §04.2541(a).

(b) Magnitude of load. The limit resultant load shall equal three-quarters of the design weight of the airplane.

(c) Hull shear and bending loads. The hull shear and bending loads shall be determined by assuming the hull structure to be supported at the wing attachment fittings and neglecting internal inertia loads. This condition need not be applied to the fittings or to the portion of the hull ahead of the rear attachment fittings. The minimum ultimate factor of safety shall be 1.5.

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04.2545 Side loading condition.

(a) Application of load. The resultant water load shall be applied in a vertical plane through the center of gravity. The vertical component shall be assumed to act in the plane of symmetry and the horizontal component at a point half-way between the bottom of the keel and the load water line at design weight (at rest).

(b) Magnitude of load. The limit vertical component of acceleration shall be 3.25 and the side component shall be equal to fifteen per cent of the vertical component.

(c) Hull shear and bending loads. The hull shear and bending loads shall be determined by proper consideration of the inertia loads or by introducing couples at the wing attachment points. To avoid excessive local shear loads, the water reaction may be distributed over the hull bottom, using pressures not less than those specified in §04.2541(a). The minimum ultimate factor of safety shall be 1.5.

04.255 (Unassigned).

04.256 (Unassigned)."

17. Section 04.331 is amended to read as follows:

"04.331 Operation test. An operation test shall be conducted by operating the controls from the pilot's compartment with the entire system so loaded as to correspond to the minimum limit control force specified in item 3 of Table 04-6 for the control system in question. In this test there shall be no jamming, excessive friction, or excessive deflection."

18. Section 04.462 is amended by striking the first two sentences and inserting in lieu thereof the following sentence: "Closed cabins on aircraft carrying more than 5 persons shall be provided with emergency exits, in addition to the one external door required by §04.461, consisting of movable windows or panels or of additional external doors which provide a clear and unobstructed opening, the minimum dimensions of which shall be such that a 19 inch by 26 inch ellipse may be completely inscribed therein."

19. Section 04.4632, as amended, is amended to read as follows: "04.4632 Means shall be provided by which the operating personnel is suitably informed of all operation information and limitations deemed necessary by the Authority."

20. By striking section 04.504.

21. Section 04.5820 is amended to read as follows:

"04.5820 General. Electrical equipment shall be installed in accordance with accepted practice and suitably protected from fuel, oil, water and other detrimental substances. Adequate clearance shall be provided between wiring and fuel and oil tanks, fuel and oil lines, carburetors, exhaust piping and moving parts."

22. Section 04.5824 is amended to read as follows:

"04.5824 Anchor lights. The anchor light specified for seaplanes and amphibians shall be so mounted and installed that, when the airplane is moored or drifting on the water, it will show a white light visible for at least two miles at night under clear atmospheric conditions."

23. By striking the word "test" in section 04.7210.

24. Section 04.723 is amended by striking the sentence, "Means shall be provided by which the pilot is suitably informed of such ceiling and the conditions under which it may be realized."

25. By striking "$0.6\Delta n_{1b}$" in line 5, column III, of table 04-1 and inserting "Fig. 04-3" in lieu thereof.

26. By striking "2.00" in line 7, column III, of table 04-1 and inserting "2.50" in lieu thereof.

27. By striking the title to Fig. 04-3 and inserting "Fig. 04-3 Maneuvering Load Factor Increment, Conditions I and III", in lieu thereof.

28. By adding Fig. 04-11, "Distribution of Local Pressures - Boat Seaplanes."

By the Authority

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