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

Regulations
Serial No. 4

At a session of the Civil Aeronautics Authority held at its office in Washington, D. C., on the 7th day of March, 1939

Acting pursuant to the authority vested in it by the Civil Aeronautics Act of 1938, particularly Sections 205 (a) and 601 (a), 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. 5 of CIVIL AIR REGULATIONS

AMENDING PART 04. AIRPLANE AIRWORTHINESS

1. Part 04. Airplane Airworthiness, of the Civil Air Regulations is hereby amended as follows:

(a) By striking out Sections 04.247, 04.417, 04.4240, 04.4260, 04.4261, 04.427, 04.4270, 04.4271, 04,4611, and 04.7430;

(b) By the addition of two new Sections 04.279 and 04.4210 reading as follows:

"04.279. All structural members in the wing lift truss system which transmit direct loads from the landing gear shall, in the landing conditions, incorporate a multiplying factor of safety not less than that specified in Table 04-7;"

"04.4210. Elevator trailing edge tab systems shall be equipped with stops which limit the tab travel to values not in excess of those provided for in the structural report. This range of tab movement shall be sufficient to balance the airplane under the conditions specified in § 04.704;"

(c) By amending Tables 04-4 and 04-7 so that in Table 04-4 in the column under "Gust" Section 04.2222 (a) is changed to Section 04.2222 (b), and in Table 04-7 a new item is added as follows:

(Item)	(Component)	(Reference Part 04)	(Add. Yield Factor of Safety, j_y)	(Add. Ult. Factor of Safety, j_u)	(May be covered by Item No.)
10	Wing lift truss (landing conditions only)	.279	None	1.10	--

(d) By amending Sections 04.053, 04.0534, 04.0540, 04.0610, 04.0612, 04.107, 04.111, 04.112, 04.114, 04.131, 04.211, 04.257, 04.260, 04.2610, 04.404, 04.4210, 04.424, 04.426, 04.444, 04.460, 04.4610, 04.4632, Paragraph (j) of Section 04.510, Paragraph (b) of Section 04.512, Paragraph (d) of Section 04.532, 04.5800, 04.5825, 04.6291, 04.743, 04.744, so that the same will read as follows:

"04.053 Type inspection procedure. The type inspection shall consist of a ground inspection and a flight test of an airplane built to conform with the technical data previously submitted and approved and on which the authorization of the type inspection was based. The following subparagraphs shall be complied with in connection with the type inspection."

"04.0534 Flight tests. The airplane shall be subjected to such flight tests as are necessary to prove compliance with the flight and operation requirements specified in ss 04.7 and to supply the pertinent information required upon a form to be supplied by the Authority."

"04.0540 Issuance of aircraft specification. Upon completion of all reports, tests and inspections required to prove compliance with the airworthiness requirements to the satisfaction of the Authority and upon receipt of the certification of the inspector (or inspectors) who conducted the type inspection to the effect that the airplane inspected was found to be airworthy, together with properly executed inspection forms specified in the preceding paragraphs, an Aircraft Specification will be issued for the type and model of the airplane in question. The Aircraft Specification will certify as to the airworthiness of airplanes of the type in question when manufactured and inspected in accordance with the provisions noted thereon."

"04.0610 Drawing changes. When a revised drawing is submitted to the Authority the manufacturer shall suitably maintain the record specified in § 04.0320(f). Corrected pages of the drawing lists shall be submitted in duplicate for each model to which the revision applies. Alternate installations shall be so designated and properly indicated on the drawing lists."

"04.0612 Major changes. Major changes, such as the installation of an engine of a type other than that covered by the original type certificate, shall require compliance with §§ 04.031, or 04.032, as the case may be, and with such current requirements as the Authority may deem necessary."

"04.105 Design Power, P. The total engine horsepower chosen for use in determining the maneuvering load factors. The corresponding engine output will be incorporated in the aircraft certificate as a maximum operational limitation in all flight operations other than take-off or climbing flight. (See § 04.744)."

"04.111 Design level speed, V_L. The indicated airspeed chosen for use in determining the pertinent structural loading conditions. This value will be incorporated in the aircraft certificate as a maximum operational limitation in level and climbing flight. (See § 04.743)."

"04.112 Design gliding speed, V_g. The maximum indicated airspeed to be used in determining the pertinent structural loading conditions. (See §§ 04.211 and 04.743)."

"04.114 Design flap speed, V_f. The indicated airspeed at which maximum operation of high-lift devices is assumed. (See §§ 04.211 and 04.743)."

"04.131 Primary structure. Those portions of the airplane, the failure of which would seriously endanger the safety of the airplane."

"04.211 Airspeeds. (See §§ 04.109 to 04.116 for definitions). The design airspeeds shall be determined as follows:

V_L (See § 04.111).

V_g shall not be less than $V_L + K_g (V_m - V_L)$, except that it need not be greater than either $V_L +$ 100 miles per hour or 1.5 V_L, whichever is lower. K_g is specified on Fig. 04-1. V_m is defined in § 04.115. A special ruling may be obtained from the Authority if the design gliding speed thus determined is greater than 1.33 V_L and appears to be unnecessarily high for the type of airplane involved.

V_f shall not be less than $2V_{sf}$. V_{sf} is defined in § 04.113.

V_p shall not be less than $V_{sf} + K_p (V_L - V_{sf})$, except that it need not be greater than V_L. K_p is specified on Fig. 04-2.

(See §§ 04.2220, 04.2223 and 04.2230 for exceptions for multi-engine airplanes.)"

"04.257 Seaplane float loads. Each main float of a float seaplane shall be capable of carrying the following loads when supported at the attachment fittings as installed on the airplane. The minimum ultimate factor of safety shall be 1.5.

(a) A limit load, acting upward, applied at the bow end of the float and of magnitude equal to one-half of that portion of the airplane gross weight normally supported by the particular float.

(b) The limit load specified in paragraph (a), above, acting upward at the stern.

(c) A limit load, acting upward, applied at the step and of magnitude equal to 1.33 times that portion of the airplane gross weight normally supported by the particular float."

"04.260 Engine torque. In the case of engines having five or more cylinders the stresses due to the torque load shall be multiplied by a limit load factor of 1.5. For 4, 3, and 2 cylinder engines the limit load factors shall be 2, 3, and 4, respectively. The torque acting on the airplane structure shall be computed for the take-off power desired and the propeller speed corresponding thereto. (See § 04.744.) The engine mount and forward portion of the fuselage and nacelles shall be designed for this condition. The minimum ultimate factor of safety shall be 1.5, except that higher factors may be prescribed by the Authority when it appears necessary to make special provision for conditions such as vibration, stress concentration, and fatigue."

"04.2610. The engine mounts, nacelles, and forward portion of the fuselage (when a nose engine is installed) shall be investigated for the limit loads determined from Condition I (see §§ 04.2131 and 04.2160) acting simultaneously with the limit loads due to the

engine torque determined in accordance with § 04.260 except that the engine power and the propeller speed shall correspond to the design power (§ 04.105) or the output specified for climbing flight (see § 04.744), whichever is higher. The minimum ultimate factor of safety shall be 1.5."

"04.404 General flutter prevention measures. The Authority reserves the right to require special provisions against flutter in any case when such provisions appear to it to be necessary. For specific requirements see §§ 04.323, 04.413, 04.423, 04.424, 04.425, 04.426, 04.4260, 04.435, 04.436, and 04.707."

"04.424 Dynamic and static balance. All control surfaces shall be dynamically and statically balanced to the degree necessary to prevent flutter at all speeds up to the design gliding speed."

"04.426 Tabs. The installation of trim and balancing tabs shall be such as to prevent the development of any free motion of the tab. When trailing edge tabs are used to assist in moving the main surface (balancing tabs), the areas and relative movements shall be so proportioned that the main surface is not overbalanced at any time."

"04.444 Retracting mechanism. When retractable landing wheels are used visual means shall be provided for indicating to the pilot, at all times, the position of the wheels. Separate indicators for each wheel are required when each wheel is separately operated unless a single indicator is obviously satisfactory. In addition, landplanes shall be provided with an aural or equally effective indicator which shall function continuously after the throttle is closed until the gear is down and locked."

"04.4440 A positive lock shall be provided for the wheels in the extended position, unless a rugged irreversible mechanism is used."

"04.4441 Manual operation of retractable landing gears shall be provided for."

"04.460 Provision for turn-over. The fuselage and cabins shall be designed to protect the passengers and crew in the event of a complete turn-over and adequate provision shall be made to permit egress of passengers and crew in such event. This requirement may be suitably modified when the possibility of a complete turn-over in landing is remote."

"04.4610. No passenger door shall be located in the plane of rotation of an inboard propeller, nor within 5° thereof as measured from the propeller hub."

"04.4632. Means shall be provided by which the operating personnel is suitably informed of the operation limitations specified in § 04.744, and of the ceilings specified in §§ 04.723 or 04.733, as the case may be."

"04.510 (j) A portable fire extinguisher, which extinguisher shall be of an approved type, which shall have a minimum capacity, if carbon tetrachloride, of one quart, or, if carbon dioxide, of two pounds, or, if other, of equivalent effectiveness; except that any extinguisher of not less than half the above capacity may be used in an airplane equipped with an engine whose maximum rating is 40 horsepower or less. (See § 04.5811 for installation requirements.)"

"04.512 (b) Two electric landing lights if the aircraft is operated for hire, provided, however, that only one such landing light shall be required for any airplane certificated for a weight of less than 1,500 pounds. (See § 04.5825 for installation requirements.)"

"04.532 (d) Two sensitive type altimeters, both of which shall be adjustable for changes in barometric pressure and compensated for changes in temperature, provided that aircraft in use on or before January 1, 1939, and thereafter replacements and additions of aircraft of the same make and model may, for purposes of standardization, be deemed to have met this requirement if there are installed in each such aircraft, one sensitive type altimeter and one standard type altimeter provided each is adjustable for changes in barometric pressure, and compensated for changes in temperature."

"04.5800 Air speed indicator. This instrument shall be so installed as to indicate true airspeed at sea level with the maximum practicable accuracy but the instrument error shall not be more than plus or minus 3 percent, except that it need not be less than plus or minus 5 miles per hour, at the level flight speed corresponding to the design power (§ 04.105), at V_L (§ 04.111), or at the maximum attainable level flight speed, whichever is lowest."

"04.5825 Landing lights. Electric landing lights shall be so installed on multi-engine aircraft that at least one shall be not less than 10 feet to the right or left of the first pilot's seat and beyond the swept disk of the outermost propeller. On single-engine aircraft such lights shall be so installed that no visible portion of the swept disk of the propeller, if of the tractor type, is illuminated thereby. Individual switches for each light shall be provided in the pilot's compartment."

"04.6291. An adequate means shall be provided for preventing the formation of ice in the engine carburetors. (See also § 04.532(i).)"

"04.743 Air speed limitations. Maximum operation limitations will be incorporated in the aircraft certificate and will specify the indicated airspeeds which shall not be exceeded in level and climbing flight (§ 04.111), in gliding and diving flight, and with flaps extended. The values in gliding flight and with flaps extended will be 10 percent less than the corresponding maximum airspeeds attained in flight tests in accordance with § 04.722."

"04.744 Power plant limitations. Maximum operational limitations will be incorporated in the aircraft certificate and will specify power plant outputs on take-off (§ 04.260), in climbing flight, and for all operations other than take-off and climbing flight (§ 04.105). The output, except for take-off, shall not exceed that corresponding to the maximum (except take-off) rating of the engine installed. For the above purposes no specified output will be in excess of that corresponding to the limits imposed by either the pertinent engine or propeller certification. (See §§ 04.60 and 04.61.)"

By the Authority:

Paul J. Frizzell,
Secretary.

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