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

Civil Air Regulations Amendment 7-2
Effective: May 17, 1958
Adopted: April 15, 1958

ROTORCRAFT AIRWORTHINESS; TRANSPORT CATEGORIES MISCELLANEOUS AMENDMENTS RESULTING FROM THE 1957 ANNUAL AIRWORTHINESS REVIEW

There are contained herein amendments with respect to various issues stemming from the 1957 Annual Airworthiness Review.

The most significant of these amendments deal with the flight requirements. Among these is included an amendment to § 7.103 (a) to eliminate the requirement for the installation of a rotor high-pitch stop when it is found that such a stop is unnecessary due to the inherent characteristics of the rotorcraft.

The powerplant and structural fire protection requirements of Part 7 applicable to Category B rotorcraft were designed to protect the rotorcraft for 5 minutes in the event of a powerplant fire. On the other hand, the regulations applicable to Category A rotorcraft were designed to give protection from powerplant fires for a sufficient time to permit continued operation to a landing area. Paragraphs (c) of § 7.116 and (d) of § 7.118 contain options for multiengine Category B rotorcraft which permit them to be certificated under the Category A rotorcraft requirements of these sections when, among other things, the fire protection requirements for Category A rotorcraft are met. This permits the establishment of limiting heights and speeds for safe landing following the failure of only one engine rather than with complete power loss, and the demonstration of an autorotative landing rather than determining the autorotative landing distances. There are contained herein amendments to the aforementioned sections which delete the requirement that multiengine Category B rotorcraft meet the fire protection requirements applicable to Category A rotorcraft when these options are exercised. It is required that the Administrator establish emergency procedures to be followed in the event of a powerplant fire, and these procedures are required to be included in the Airplane Flight Manual for Category B rotorcraft. Such procedures normally entail the execution of an immediate landing. In applying operating limitations to such rotorcraft, it is the Board's understanding that the Administrator will require an immediate landing in the event of fire while in flight.

The take-off provisions of Part 7 require the establishment of a critical decision point for Category A rotorcraft, at which point the rotorcraft is required to have attained the take-off safety speed necessary to comply with the climb requirements at that point as well as to be able to be stopped safely following the engine failure at the critical decision point. Section 7.114 (a)(2) is being amended to permit the rotorcraft to be at a speed less than the take-off safety speed at the critical decision point and, after failure of the critical engine at that point, permit continued acceleration so that at the end of the rejected take-off distance a speed of not less than the take-off safety speed is attained.

A significant addition to the regulations is included with respect to § 7.401. This section is being amended to require a means of protection against cooling fan blade failures. This amendment permits alternative means of compliance either by containment of the blades in the event of failure or by designing the fan so that it will not fail as a result of engine overspeed.

When this part was originally promulgated the rotorcraft operating limitations with respect to night and instrument flight were included in § 7.120. These limitations are now being placed in § 7.20 with minor editorial changes. The Board appreciates that the development of automatic stabilization devices has progressed rapidly and that the limitations contained herein might be unduly conservative in respect of certain rotorcraft. The Board is, therefore, prepared to reconsider these limitations during future annual airworthiness reviews.

In addition to the aforementioned changes, there are a number of relatively minor amendments dealing with definitions and flight requirements.

Interested persons have been afforded an opportunity to participate in the making of this amendment (22 F.R. 9116), and due consideration has been given to all relevant matter presented.

In consideration of the foregoing, the Civil Aeronautics Board hereby amends Part 7 of the Civil Air Regulations (14 CFR Part 7, as amended) effective May 17, 1958:

1. By amending § 7.1(c)(1) by inserting between the words "atmosphere" and "defined" the following: "(see NACA Technical Report 1235)".

2. By amending § 7.1(c)(1)(iv) by deleting the expression "-67° F." and inserting in lieu thereof "-69° F."

3. By amending § 7.1(c)(1)(v) by deleting the numerals "0.002378" and inserting in lieu thereof "0.002377".

4. By deleting § 7.1 (c)(6).

5. By amending § 7.1 (d)(6)(i) by adding a new sentence at the end thereof to read as follows: "For other fuels, a design unit weight or range of weights appropriate to the type of fuel shall be established."

6. By amending § 7.1 (g) by amending the title, by amending subparagraphs (2) and (3), by redesignating subparagraphs (4) and (5) as subparagraphs (5) and (6), respectively, and by adding a new subparagraph (4) to read as follows:

7.1 Definitions * * *

(g) Powerplant installation * * *

(2) Take-off power or thrust

(i) Take-off power for reciprocating engines is the brake horsepower developed under standard sea level conditions, under the maximum conditions of crankshaft rotational speed and engine manifold pressure approved for the normal take-off, and limited in use to a maximum continuous period as indicated in the approved engine specification.

(ii) Take-off power for turbine engines is the brake horsepower developed under static conditions at specified altitudes and atmospheric temperatures, under the maximum conditions of engine rotor shaft rotational speed and gas temperature approved for normal take-off, and limited in use to a maximum continuous period as indicated in the approved engine specification.

(iii) Take-off thrust for turbine engines is the jet thrust developed under static conditions at specified altitudes and atmospheric temperatures, under the maximum conditions of engine rotor shaft rotational speed and gas temperature approved for the normal take-off, and limited in use to a maximum continuous period as indicated in the approved engine specification.

(3) Maximum continuous power or thrust.

(i) Maximum continuous power for reciprocating engines is the brake horsepower developed in standard atmosphere at a specified altitude, under the maximum conditions of crankshaft rotational speed and engine manifold pressure, and approved for use during periods of unrestricted duration.

(ii) Maximum continuous power for turbine engines is the brake horsepower developed at specified altitudes, atmospheric temperatures, and flight speeds, under the maximum conditions of engine rotor shaft rotational speed and gas temperature, and approved for use during periods of unrestricted duration.

(iii) Maximum continuous thrust for turbine engines is the jet thrust developed at specified altitudes, atmospheric temperatures, and flight speeds, under the maximum conditions of engine rotor shaft rotational speed and gas temperature, and approved for use during periods of unrestricted duration.

(4) Gas temperature. Gas temperature for turbine engines is the temperature of the gas stream obtained as indicated in the approved engine specification.

7. By amending § 7.20 by adding a new paragraph (c) to read as follows:

7.20 Rotorcraft categories * * *

(c) The eligibility of rotorcraft for night and instrument flight shall be in accordance with subparagraphs (1) and (2) of this paragraph.

(1) Category A. Rotorcraft in this category shall be eligible for night and instrument flight, except that the rotorcraft shall have such additional flight characteristics as the Administrator finds are essential for safe operations under these conditions.

(2) Category B. Rotorcraft in this category shall not be eligible for unlimited night and instrument flight. Rotorcraft in this category, however, shall be eligible for night flight under VFR conditions, except that the rotorcraft shall have such additional flight characteristics as the Administrator finds are essential for safe operation under these conditions.

8. By amending § 7.103 (a) by adding the following phrase to the end of the second sentence: "however, such means need not be provided if the Administrator finds that inherent characteristics of the rotorcraft rotor speeds are provided" and by adding the following phrase at the beginning of the third sentence: "If a means to prevent low rotor speeds is provided,"

9. By amending § 7.111 (c) by deleting the words "as well as with § 7.384(a) of this part," and by adding the to read as follows:

"NOTE: (See § 7.384 (b).) Category B rotorcraft structure, controls, rotor mechanisms, and parts essential to a controlled landing are protected from powerplant fires for at least 5 minutes."

10. By amending § 7.114 (a) by deleting the words "accelerated stop" and inserting in lieu thereof the words "rejected take-off".

11. By amending § 7.114 (a)(1) by deleting the words "accelerated stop" and inserting in lieu thereof the words "rejected take-off", and by adding the following phrase at the end of the subparagraph "with the remaining engines operating within their approved limitations."

12. By amending § 7.114 (a)(2) by adding to the second sentence between the words "limitations" and "the climb-out" the words "the rotorcraft shall be accelerated such that the take-off safety speed is reached by the end of the rejected take-off distance and".

13. By amending § 7.114 (a)(3) by deleting the term "accelerate-stop" and inserting in lieu thereof the words "rejected take-off".

14. By amending § 7.115 (a)(1)(v), (a)(2)(v), and (a)(3)(v) by deleting the words "in the hot-day condition" in each subdivision and inserting in lieu thereof the words "at the temperatures and altitudes for which certification is sought."

15. By amending § 7.115 (b)(3) to read as follows:

7.115 Climb; one-engine-inoperative. * * *

(b) Category B. * * *

(3) For all helicopters, the steady angle of glide shall be determined at the maximum and minimum rate-of-descent speed in autorotation at maximum weight at the optimum forward speed.

16. By amending § 7.118 (b) by adding a new sentence at the end thereof to read as follows: "The maximum permissible speed descent in autorotation shall be determined."

17. By amending § 7.118 (c) by deleting subparagraph (3).

18. By amending § 7.118 (d) by deleting the words "and § 7.384 (a)".

19. By amending § 7.120 (c) to read as follows:

7.120 General. * * *

(c) For the eligibility of rotorcraft for night and instrument flight see § 7.20 (c).

20. By amending § 7.123 (b)(4)(i) by adding the following words at the end thereof "except for Category A helicopters the weight shall be that determined for hovering. (See § 7.116 (a).)"

21. By amending § 7.131 by deleting the word "uncontrollable" and by adding the following words at the end thereof "unless the Administrator finds that such tendencies are not dangerous."

22. By amending § 7.401 by adding a new paragraphs (d) and (e) to read as follows:

7.401 Engines * * *

(d) Category A; engine cooling fan blade protection. If an engine cooling fan is installed, means shall be provided to insure that the occurrence of a fan blade failure will not affect the operation of the remaining engine(s) nor jeopardize the continued safe operation of the rotorcraft.

(e) Category B; engine cooling fan blade protection. If an engine cooling fan is installed, means shall be provided to protect the rotorcraft and to permit a safe landing in the event of a fan blade failure. Compliance shall be shown with any one of the provisions of subparagraphs (1) through (3) of this paragraph.

(1) It shall be demonstrated that the fan blades will be contained in the event of failure;

(2) The fan is so located that a fan blade failure will not jeopardize the safety of the rotorcraft or its occupants; or

(3) It shall be demonstrated that the fan blade can withstand an ultimate load of 1.5 times the centrifugal force resulting from engine rpm limited by either:

(i) The engine terminal rpm which can occur under uncontrolled conditions, or

(ii) An overspeed limiting device.

(Sec. 205, 52 Stat. 984; 49 U.S.C. 425. 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)

Part 7 last printed August 1, 1956.