UNITED STATES OF AMERICA
FEDERAL AVIATION AGENCY
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Civil Air Regulations Amendment 6-4
Effective: October 1, 1959
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PART 6—ROTORCRAFT AIRWORTHINESS; NORMAL CATEGORY

Miscellaneous Amendments Resulting From the 1958 Annual Airworthiness Review

There are contained herein amendments as a result of the 1958 Annual airworthiness Review.

In the flight requirements, a revision to § 6.121 replaces the current requirement for a demonstration of controllability after power failure at only one high speed condition with a requirement for controllability after power failure over the range of air speeds and altitudes for which certification is sought. A revision to § 6.123, while still requiring satisfactory controllability, permits a slight negative slope of the stick position versus speed curve over the speed ranges prescribed.

A number of changes are being made with respect to the structural provisions. The requirement for ground vibration tests previously set forth in § 6.203 is being deleted. This action is based upon the conclusion that if any major component has a natural frequency which would be significantly excited by some operating parameter, such a condition would be revealed in the course of other flight and ground tests. Section 6.235, having to do with the braked roll condition, is being amended to indicate that where rotor lift is present a load factor of 1.0 is acceptable in place of 1.33. In order to standardize the test procedure used in the shock absorption tests of § 6.237, this section is being changed to specify the attitude of the landing gear during drop tests. Another change to the structural provisions is being made to § 6.247, covering skid gear ground loading conditions. This amendment permits, when applicable, the use of more than limit rotor lift in the conduct of the ultimate drop test.

Several changes are being made to the sections dealing with control system design. One, to § 6.320, adds a requirement aimed at minimizing the possibility of incorrect assembly of the elements of the flight control system. In addition, a new § 6.328 is being included to provide minimum safety standards for power-operated control systems.

In the subpart dealing with powerplant installations, § 6.420 is being revised to include requirements for multiengine rotorcraft which employ a common fuel tank. Section 6.424 is being amended to provide for automatically activated or continuously operating emergency fuel pumps. This change is intended to assure that in the event of failure of the main fuel pump, fuel would continue to be supplied to the engine without requiring action by the pilot. Sections 6.445 and 6.446 are being deleted inasmuch as the requirements of these sections are now covered in § 6.604. By the amendment to § 6.485, the use of rigid fuel lines is permitted regardless of whether or not the line is under pressure, provided there is no other requirement for flexibility.

Section 6.604, covering powerplant instruments, is being revised to no longer require oil temperature indicators for all gearboxes but to require an oil temperature warning device for main rotor drive gearboxes. A new § 6.606 is being added to indicate the general requirements for reliability of equipment and systems. Since it is difficult to maintain low speeds during climb-out and because the pilot's attention is not likely to be concentrated on the air-speed indicator during the takeoff maneuver much before climb-out speed is reached, § 6.612 is being revised to make the requirement for air-speed indicator accuracy at low speeds more realistic. Section 6.621 is being amended to cover new types of storage batteries as well as the conventional lead-acid type.

In the subpart dealing with operating limitations and information, the limiting height-speed diagram for safe landing after power failure has been transferred from operating limitations to operating information by deleting § 6.715 and § 6.741(f) and by inserting the text of the latter in § 6.743. The flight test requirements to establish the diagram are being inserted as a new § 6.116. Through these changes, the height-speed diagram will no longer be a limitation under the type certificate, but may be applied as a limitation in particular types of operations under the operating rules.

In addition, there are included other changes which are of a clarifying or editorial nature.

Interested persons have been afforded an opportunity to participate in the making of this amendment (24 F.R. 128),

and due consideration has been given to all relevant matter presented.

In consideration of the foregoing, Part 6 of the Civil Air Regulations (14 CFR Part 6, as amended) is hereby amended as follows, effective Oct. 1, 1959:

§ 6.1 [Amendment]

1. By amending § 6.1(c)(3) by deleting the phrase "by the U.S. National Advisory Committee for Aeronautics" and inserting in lieu thereof the phrase "by the National Aeronautics and Space Administration (formerly the National Advisory Committee for Aeronautics)".

2. By amending § 6.1(e)(4) by deleting the parenthetical expression "($TAS = EAS\ (\rho_0/\rho)^{1/2}$)" and inserting in lieu thereof the parenthetical expression "($TAS = EAS\ (\rho_0/\rho)^{1/2}$)".

§ 6.110 [Amendment]

3. By amending § 6.110 by deleting the phrase "through 6.115" and inserting in lieu thereof the phrase "through 6.116".

§ 6.111 [Amendment]

4. By amending § 6.111 by deleting the parenthetical expression "(See §§ 6.715, 6.740, and 6.742)" and inserting in lieu thereof "(See §§ 6.116, 6.740, 6.742 and 6.743)".

5. By adding a new § 6.116 to read as follows:

§ 6.116 Limiting height and speeds for safe landing following power failure.

If a range of heights exists at any speed, including zero, within which it is not possible to make a safe landing following power failure, the range of heights and its variation with forward speed shall be established together with any other pertinent information, such as type of landing surface. Such an envelope shall be established in full autorotation for single-engine helicopters and with one engine inoperative for multiengine helicopters provided that engine isolation design features are incorporated to assure continued operation of the remaining engines. (See § 6.743 (c).)

6. By amending § 6.121 by adding a new paragraph (e) to read as follows:

§ 6.121 Controllability.

* * * * *

(e) Controllability after power failure shall be demonstrated over the range of air speeds and altitudes for which certification is sought, starting with maximum continuous power at critical weight. In taking corrective action, the time delay for all flight conditions shall be based on the normal pilot reaction time, except that for the cruise condition the time delay shall not be less than one second.

7. By amending § 6.123(b) by deleting the words "and maintain" in two places, by amending the introductory paragraphs of subparagraphs (1), (2), and (3), and by adding a note to read as follows:

§ 6.123 Stability.

* * * * *

(b) *Static longitudinal stability.* * * *

(1) *Climb.* At all speeds from $0.85V_Y$ to $1.2V_Y$ with: * * *

(2) *Cruise.* At all speeds from $0.7V_H$ or $0.7V_{NE}$, whichever is less, to $1.1V_H$ or $1.1V_{NE}$, whichever is less, with: * * *

(3) *Autorotation.* Throughout the speed range for which certification is sought, with: * * *

(4) *Hovering.* * * *

NOTE: It is considered acceptable for the stick position versus speed curve to have a negative slope within the speed range specified for each of the conditions in subparagraphs (1) through (3) of this paragraph, provided the negative stick displacement required is not greater than 10 percent of the total stick travel.

§ 6.140 [Amendment]

8. By amending § 6.140 by deleting the parenthetical expression "(See also §§ 6.203(f) and 6.711.)" and inserting in lieu thereof "(See § 6.711.)".

§ 6.203 [Amendment]

9. By amending § 6.203 by deleting paragraph (f) and by redesignating paragraph (g) as paragraph (f).

§ 6.235 [Amendment]

10. By amending § 6.235 by deleting the second sentence and inserting in lieu thereof a new sentence to read as follows: "The limit vertical load shall be based upon a load factor of 1.33 when the rotorcraft attitude is as specified in § 6.231(a)(1); the limit vertical load factor may be reduced to 1.0 when the attitude is as specified in § 6.231(a)(2)."

§ 6.237 [Amendment]

11. By amending § 6.237(a) by adding at the end thereof a new sentence to read as follows: "The attitude in which the landing gear unit is tested shall be such as to simulate the landing condition which is critical from the standpoint of the energy to be absorbed by the particular unit."

§ 6.246 [Amendment]

12. By amending § 6.246(f) by deleting the second sentence and inserting in lieu thereof a new sentence to read as follows: "The limit vertical load shall be based upon a load factor of 1.33 when the rotorcraft attitude is as specified in paragraph (b) of this section; the limit vertical load factor may be reduced to 1.0 when the attitude is as specified in paragraph (a) of this section."

§ 6.247 [Amendment]

13. By amending § 6.247(a) by adding at the end thereof the following words "with the assumed rotor lift not to exceed 1.5 times the rotor lift used in the limit drop tests prescribed in § 6.237(a)."

§ 6.320 [Amendment]

14. By amending § 6.320 by adding before the parenthetical expression a new sentence to read as follows: "The elements of the flight control system shall be designed or shall be distinctively and permanently marked to minimize the possibility of incorrect assembly which could result in the malfunctioning of the control system."

15. By adding a new § 6.328 to read as follows:

§ 6.328 Power boost and power-operated control systems.

When a power boost or power-operated control system is used, an alterna system shall be immediately available, such that the rotorcraft can be flown and landed safely in the event of any single failure in the power portion of the system or in the event of failure of all engines. Such alternate system may be a duplicate power portion or a manually operated mechanical system. The power portion shall include the power source (e.g., hydraulic pumps), and such items as valves, lines, and actuators. The failure of mechanical parts (such as piston rods and links) and the jamming of power cylinders need not be considered if such failure or jamming is considered to be extremely remote.

16. By amending § 6.420 by adding a new section title, by redesignating the present title and text as paragraph (a), by deleting the parenthetical expression "(see § 6.604(a)(1))" and inserting in lieu thereof "(see § 6.604(d))", and by adding a new paragraph (b) to read as follows:

§ 6.420 Fuel system design and arrangement.

* * * * *

(b) *Fuel system independence.* The design of the fuel system for multiengine rotorcraft shall be such as to permit fuel to be supplied to each engine through a system independent of all portions of the systems supplying fuel to other engines, except that separate fuel tanks need not be provided for each engine. The following features shall be provided if a single fuel tank is employed on a multiengine rotorcraft:

(1) Independent tank outlets for each engine. Each outlet shall incorporate a shutoff valve at the tank. This valve may also serve as the firewall shutoff valve required by § 6.426 provided the line between the valve and the engine compartment does not contain a hazardous amount of fuel which can drain into the engine compartment.

(2) At least 2 vents arranged to minimize the possibility of both vents becoming obstructed simultaneously.

(3) Filler caps designed to minimize the possibility of incorrect installation or loss in flight.

(4) The fuel system from the tank outlet to the engine shall be entirely independent of any portion of the system supplying fuel to the other engine(s).

§ 6.421 [Amendment]

17. By amending § 6.421 by deleting the reference "6.741(g)" in the parenthetical expression at the end of the section and inserting in lieu thereof "6.741(f)".

§ 6.424 [Amendment]

18. By amending § 6.424 by adding two new sentences between the first and second sentences to read as follows: "The emergency pump shall be actuated automatically or operated continuously such that sufficient fuel pressure will be maintained to prevent engine stoppage after failure of the mechanical pump. Means

shall be provided for indication to the pilot when the emergency system is in operation."

§ 45 [Deletion]

19. By deleting § 6.445.

§ 6.446 [Deletion]

20. By deleting § 6.446.

§ 6.480 [Amendment]

21. By amending § 6.480 by deleting the phrase "through 6.484" and inserting in lieu thereof "through 6.486".

22. By amending § 6.485 to read as follows:

§ 6.485 Lines and fittings.

(a) All lines and fittings carrying flammable fluids in areas subject to engine fire conditions shall be fire resistant, except as otherwise provided in this section. If flexible hose is used, the assembly of hose and end fittings shall be of an approved type. The provisions of this paragraph shall not apply to those lines and fittings which form an integral part of the engine.

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

23. By amending § 6.604 to read as follows:

§ 6.604 Powerplant instruments.

(See § 6.613 for installation requirements.)

(a) Carburetor air temperature indicator for each engine equipped with a preheater which is capable of providing a heat rise in excess of 60° F.

(b) Cylinder head temperature indicator for each air-cooled engine or rotorcraft equipped with cooling shutters. In the case of rotorcraft which do not have cooling shutters, an indicator shall be provided if compliance with the provisions of § 6.451 is demonstrated in a condition other than the most critical cooling flight condition.

(c) Fuel pressure indicator for each engine (if pump-fed engines are used).

(d) Fuel quantity indicator for each tank. (See § 6.420(a).)

(e) Manifold pressure indicator for each engine (if altitude engines are used).

(f) Oil temperature warning device to indicate when the oil temperature exceeds a safe value in each main rotor drive gearbox (including those gearboxes essential to rotor phasing) having an oil system independent of the engine oil system.

(g) Oil pressure warning device to indicate when the oil pressure falls below a safe value in each pressure lubricated main rotor drive gearbox (including those gearboxes essential to rotor phasing) having an oil system independent of the engine oil system.

(h) Oil pressure indicator for each engine.

(i) Oil quantity indicator for each oil tank. (See 6.613(d).)

(j) Oil temperature indicator for each engine.

(k) Tachometer to indicate engine rpm and rotor rpm for the main rotor, or for each main rotor, the speed of which can vary appreciably with respect to another main rotor.

24. By adding a new § 6.606 to read as follows:

§ 6.606 Equipment, systems, and installations.

(a) *Functioning and reliability.* All equipment, systems, and installations, the functioning of which is necessary in showing compliance with the regulations in this subchapter, shall be designed and installed to insure that they will perform their intended function reliably under all reasonably foreseeable operating conditions.

(b) *Hazards.* All equipment, systems, and installations shall be designed to safeguard against hazards to the rotorcraft in the event of their malfunctioning or failure.

§ 6.612 [Amendment]

25. By amending § 6.612(a) by deleting the last sentence and inserting in lieu thereof a new sentence to read as follows: "The allowable installation error shall not be exceeded at any forward speed above 80 percent of the climbout speed."

§ 6.613 [Amendment]

26. By amending § 6.613 by deleting paragraphs (e), (f), (g), and (h).

27. By amending § 6.621 to read as follows:

§ 6.621 Storage battery design and installation.

Storage batteries shall be of such design and so installed that:

(a) Safe cell temperatures and pressures are maintained during any probable charging or discharging condition. No uncontrolled increase in cell temperature shall result when the storage battery is recharged (after previous complete discharge) at maximum regulated voltage, during a flight of maximum duration, under the most adverse cooling condition likely to occur in service. Tests to demonstrate compliance with this regulation shall not be required if satisfactory operating experience with similar batteries and installations has shown that maintaining safe cell temperatures and pressures presents no problem.

(b) Explosive or toxic gases emitted by the storage battery in normal operation, or as the result of any probable malfunction in the charging system or battery installation, shall not accumulate in hazardous quantities within the rotorcraft.

(c) Corrosive fluids or gases which may be emitted or spilled from the storage battery shall not damage surrounding rotorcraft structure or adjacent essential equipment.

§ 6.632 [Amendment]

28. By amending § 6.632(e) by deleting the word "noncombustible" and inserting in lieu thereof "flame-resistant."

§ 6.715 [Deletion]

29. By deleting § 6.715.

§ 6.732 [Amendment]

30. By amending § 6.732 by deleting the parenthetical expression "(See §§ 6.612(a), 6.710, 6.711, 6.712, 6.713, and 6.715)" and inserting in lieu thereof "(See §§ 6.116, 6.612(a), 6.710, 6.711, 6.712, and 6.713)".

§ 6.736 [Amendment]

31. By amending § 6.736 by deleting the parenthetical expression at the end of the section and inserting in lieu thereof "(See § 6.741(f).)"

§ 6.741 [Amendment]

32. By amending § 6.741 by deleting paragraph (f) and by redesignating paragraph (g) as paragraph (f).

33. By amending § 6.743 by deleting from the introductory paragraph the phrase "in paragraphs (a) and (b)" and inserting in lieu thereof "in paragraphs (a) through (c)" and by adding a new paragraph (c) to read as follows:

§ 6.743 Performance information.

* * * * *

(c) Sufficient information to outline the limiting heights and corresponding speeds for safe landing after power failure. (See § 6.116.)

(Secs. 313(a), 601, 603, 72 Stat. 752, 775, 776; 49 U.S.C. 1354(a), 1421, 1423)

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E. R. QUESADA,
Administrator.

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