

## Title 14—AERONAUTICS AND SPACE

### Chapter I—Federal Aviation Agency [Docket Nos. 6023, 6024; Amdt. No. 29-1]

#### PART 29—AIRWORTHINESS STANDARDS; TRANSPORT CATEGORY ROTORCRAFT

##### 2½-Minute and 30-Minute Power for Multiengine, Turbine Engine Powered Helicopters

This amendment allows the type certification of multiengine, turbine engine powered helicopters for a 30-minute power setting greater than maximum continuous power and for a 2½-minute power setting greater than takeoff power. It is limited to helicopters with engines type certificated for 30-minute power or 2½-minute power (as appropriate) under Part 33. If certification for the use of 30-minute power or 2½-minute power is not desired, these helicopters may of course continue to be certificated under the appropriate standards for other transport category helicopters. These powers may be used in meeting the climb and en route performance requirements of § 29.87 and the requirement in § 29.79 to establish the limiting heights and speeds for a safe landing following a power failure during takeoff.

These amendments are based on, and reflect industry comments concerning, Notice of Proposed Rule Making 64-35 (30-minute power) and 64-36 (2½-minute power), published at 29 F.R. pages 7775 and 7776, respectively, on June 18, 1964. Except as modified by the following discussion, the reasons for these amendments are those contained in the respective notices. Since the recodification of Part 7 of the Civil Air Regulations into Part 29 of the Federal Aviation Regulations has been completed, without substantive change, subsequent to the publication of Notices 64-35 and 64-36, these amendments are made to Part 29. The limitation of this amendment to multiengine, turbine engine powered transport category helicopters is necessary for safety since the manufacturers and operators of these helicopters have shown that the increased power can be safely used in the operation of these helicopters, whereas no similar showing has been made for other helicopters. With respect to normal category helicopters, the probability of there being multiengine, turbine engine powered helicopters with maximum weights of 6,000 pounds or less is not felt to be great enough to warrant delaying this amendment.

The following discussion follows the order in which the notices were published.

(a) *30-minute power.* Changes to the proposals in Notice 64-35, and Agency disposition of comments from industry are as follows:

(1) A general comment from the Air Line Pilots Association (ALPA) concerned the relationship between the 30-minute power allowance proposed in Notice 64-35 and a substantially simi-

lar allowance that the Agency has granted in certain cases under "interim" standards pending formal rule making. In these cases, beginning in 1961, the Agency has authorized the use of takeoff power to meet the en route climb requirements of Part 7 for multiengine turbine engine powered helicopters in transport categories A and B. These authorizations allowed the use of takeoff power for 30 minutes under appropriate standards. ALPA commented that the level of safety of these "interim" cases was below that which would result from compliance with standards proposed in the notice, and that, therefore, credit for 30-minute power should be granted only for engines that meet those proposed standards and that the standards for inspection and removal of turbine engines should be more restrictive for engines approved under the "interim" 30-minute authorizations. Experience has shown that the approvals granted under the "interim" standards provide a level of safety equivalent to that provided under the standards proposed in the notice. This comment cannot, therefore, be adopted. This comment nevertheless demonstrates the importance of making clear the Agency's intentions with respect to approvals granted under the "interim" standards. The Agency intends that those standards simply be superseded by the standards in this amendment with no adverse effect on approvals already granted. Thus, operations being conducted with helicopters type certificated under the "interim" standards will not be affected by the standards in this amendment, and may continue as before.

(2) Proposed § 7.405 provided that the testing prescribed in that section would be accepted for helicopter engine-type certification if the power levels used for the transmission test are also used to substantiate the corresponding power ratings intended to be established for the engine. Since the power levels used in showing compliance with Part 33 determine the power ratings for which any engine may be type certificated, this requirement is deleted as surplus.

(3) The notice proposed to require, in CAR § 7.452, that, for the climb-cooling test, 30-minute-rated engines be operated at 30-minute power for a certain period and then at "maximum continuous for the remainder of the test." This requirement unintentionally neglected the fact that, as in the case of other engines, there may be an altitude ("critical altitude") above which maximum continuous power is not available to 30-minute-rated engines. Thus, for these engines as well as for others, final § 29.1045(c) allows the use of full throttle instead of maximum continuous power above this critical altitude.

(4) The Aerospace Industries Association of America, Inc. (AIA), commented that the language in proposed § 7.714 (e) limiting the use of 30-minute power to 30 minutes was redundant since time is a factor in the definition of 30-minute power (now in Pt. 1). The intent of the limitation in proposed § 7.714(e) is to establish an operating limitation on the type certificate of the helicopter con-

sistent with the requirements for the approval of engines under Part 33. The time limitation in the definition of 30-minute power in Part 1 is not a rule but, like every definition in that part, a mere definition of a term without independent regulatory effect. The time limitation in proposed § 7.714(e) is thus not redundant. This comment must, therefore, be rejected. However, AIA also suggests that, if the time limitation is retained in § 7.714(e), it should be phrased to make it clear that the limitation refers only to the length of time of each period of use of 30-minute power, not to the total time allowed for the use of that power before engine teardown. This comment is accepted. The Agency does not intend to restrict the number of 30-minute periods of the use of 30-minute power, nor is it intended to require that any action be taken with respect to any engine at the end of any such period. This change appears in new § 29.1521(g).

(b) *2½-minute power.* Changes to the proposals in Notice 64-36, and Agency disposition of comments from industry, are as follows:

(1) The Air Line Pilots Association commented concerning the danger of abuses in operation with respect to the 2½-minute power rating and recommended that this rating be established by the same means as the normal takeoff rating. Experience with operators of rotorcraft certificated under the "interim" standards for 2½-minute power reveals no evidence of abuse of this allowance in operation. This recommendation would also defeat the purpose of the proposal and of Amendment 13-8, in which substantiation of engines for 2½-minute power was added to former Part 13 to take care of the relatively infrequent case of engine failure during takeoff and approach to landing. To require that the means for establishing the normal takeoff rating be applied to the 2½-minute power rating would be unnecessarily restrictive. This comment cannot, therefore, be accepted.

(2) The proposed addition of a new § 7.401(f) is not carried out in this amendment. That proposal concerned means for preventing hazardous overboosting of the engine. Additional study of the effects of overboost on the fatigue life of the engine is necessary. This problem has implications going beyond the 2½-minute power proposal. A separate regulatory proposal is being considered for the broader problem of engine fatigue life. Any action taken as a result of this separate proposal will reflect comments received concerning proposed § 7.401(f). During past type certifications of multiengine, turbine engine powered helicopters for the use of 2½-minute power, certain structural conditions were applied to fit each case. These conditions do not appear in this amendment. They will be applied, on an actual notice basis, during future type certifications pending the development of rules of general applicability.

(3) The comments raised by AIA concerning the redundancy of the time limitation in the 30-minute power rating and the need to make it clear that that rating is not limited to one 30-minute period

(As published in the Federal Register 30 F.R. 8777 on July 13, 1965)

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were also raised concerning the 2½-minute power rating. For the reasons stated in paragraph (a)(4) of this preamble, the time limitation is retained and the language is changed to make it clear that there is no limitation on the number of periods in which 2½-minute power may be used. This change appears in new § 29.1521(f).

In consideration of the foregoing, Part 29 of the Federal Aviation Regulations is amended, effective August 12, 1965, as hereinafter set forth.

1. Section 29.67 is amended by amending § 29.67 (a) (2) (i), (3) (i), and (b) to read as follows:

§ 29.67 Climb: one engine inoperative.

- (a) \* \* \*
- (2) \* \* \*

(i) The critical engine inoperative and the remaining engines at maximum continuous power, or (for helicopters for which certification for the use of 30-minute power is requested), at 30-minute power;

- (3) \* \* \*

(i) The critical engine inoperative, and the remaining engines at maximum continuous power and (for helicopters for which certification for the use of 30-minute power is requested), at 30-minute power;

(b) For multiengine category B helicopters meeting the requirements for category A in § 29.79, the steady rate of climb (or descent) must be determined at the speed for best rate of climb (or minimum rate of descent) with one engine inoperative and the remaining engines at maximum continuous power and (for helicopters for which certification for the use of 30-minute power is requested), at 30-minute power.

2. Section 29.79(b)(1) is amended to read as follows:

§ 29.79 Limiting height-speed envelope.

- (b) \* \* \*

(1) For category A rotorcraft, sudden failure of the critical engine with the remaining engines at the greatest power for which certification is requested;

3. Section 29.923 is amended by amending paragraphs (a), (b), and (f), by redesignating paragraphs (k), (l), and (m) as paragraphs (l), (m), and (n), respectively, and by adding new paragraph (k):

§ 29.923 Rotor drive system and control mechanism tests.

(a) *Endurance tests; general.* Each rotor drive system and rotor control mechanism must be tested, as prescribed in paragraphs (b) through (k) of this section, for at least 200 hours plus the time required to meet paragraphs (b) (2) and (k) of this section. These tests must be conducted as follows:

(1) Ten-hour test cycles must be used.

(2) The tests must be conducted on the rotorcraft.

(3) The test power must be—

(i) Determined by the powerplant limitations; and

(ii) Absorbed by the actual rotors to

be installed.

(b) *Endurance tests; takeoff power run.* The takeoff power run endurance test must be conducted as follows:

(1) Except as prescribed in subparagraph (2) of this paragraph, the takeoff power run must consist of 1 hour of alternate runs of 5 minutes at takeoff power and speed, and 5 minutes at as low an engine idle speed as practicable. The engine must be declutched from the rotor drive system, and the rotor brake, if furnished and so intended, must be applied during the first minute of the idle run. During the remaining 4 minutes of the idle run, the clutch must be engaged so that the engine drives the rotors at the minimum practical r.p.m. Acceleration of the engine and the rotor drive system must be done at the maximum rate. When declutching the engine, it must be decelerated rapidly enough to allow the operation of the overrunning clutch.

(2) For helicopters for which the use of 2½-minute power is requested, the takeoff power run must be conducted as prescribed in subparagraph (1) of this paragraph, except for the third and sixth run for which takeoff power and speed are prescribed in that subparagraph. For these two takeoff power runs, the following apply:

(i) Each run must consist of at least one period of 2½ minutes with takeoff power on all engines.

(ii) Each run must consist of at least one period, for each engine in sequence, during which that engine simulates a power failure and the remaining engines are run at 2½-minute power for 2½ minutes.

(f) *Endurance tests; 60 percent of maximum continuous run.* Two hours, or, for helicopters for which the use of 30-minute power is requested, 1 hour of continuous operation at 60 percent of maximum continuous power must be conducted at minimum desired cruising speed or at 90 percent of maximum continuous speed, whichever is less.

(k) *Endurance tests; 30-minute power run.* For helicopters for which the use of 30-minute power is requested, a run at 30-minute power must be conducted as follows:

(1) For each engine, in sequence, that engine must be inoperative and the remaining engines must be run for a 30-minute period.

(2) The number of periods prescribed in subparagraph (1) of this paragraph may not be less than the number of engines, nor may it be less than two.

4. Section 29.1045(c) is amended to read as follows:

§ 29.1045 Climb cooling test procedures.

(c) Each operating engine must—

(1) For helicopters for which the use of 30-minute power is requested, be at 30-minute power for 30 minutes, and then at maximum continuous power (or at full throttle, when above the critical altitude); and

(2) For other rotorcraft, be at maximum continuous power or thrust (or at

full throttle, when above the critical altitude).

5. Sections 29.1047(a) (3) and (4) are amended to read as follows:

§ 29.1047 Takeoff cooling test procedures.

- (a) \* \* \*

(3) The operating engines must be at the greatest power for which approval is sought (or at full throttle when above the critical altitude) for the same period as this power is used in determining the takeoff climbout path under § 29.59.

(4) At the end of the time interval prescribed in subparagraph (3) of this paragraph, the power must be changed to that used in meeting § 29.67(a)(2) and the climb must be continued for at least—

(i) Thirty minutes, if 30-minute power is used; or

(ii) Five minutes after the occurrence of the highest temperature recorded, if maximum continuous power is used.

6. Section 29.1521 is amended by adding the following new paragraphs (f) and (g):

§ 29.1521 Powerplant limitations.

(f) *Two and one-half-minute power operation.* For helicopters for which compliance with the 2½-minute power requirements of this part is shown, the established time limit for the use of 2½-minute power must be 2½ minutes for any period in which that power is used. The use of 2½-minute power must also be limited by—

(1) The maximum rotational speed, which may not be greater than—

(i) The maximum value determined by the rotor design; or

(ii) The maximum value shown during the type tests;

(2) The maximum allowable gas temperature;

(3) The maximum allowable torque; and

(4) The maximum allowable oil temperature.

(g) *Thirty-minute power operation.* For helicopters for which compliance with the 30-minute power requirements of this part is shown, the established time limit for the use of 30-minute power must be 30 minutes for any period in which that power is used. The use of 30-minute power must also be limited by—

(1) The maximum rotational speed, which may not be greater than—

(i) The maximum value determined by the rotor design; or

(ii) The maximum value shown during the type tests;

(2) The maximum allowable gas temperature;

(3) The maximum allowable torque; and

(4) The maximum allowable oil temperature.

(Secs. 318(a), 601, and 608, Federal Aviation Act of 1958; 49 U.S.C. 1354(a), 1421, and 1423)

Issued in Washington, D.C., on July 6, 1965.

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