UNITED STATES OF AMERICA
FEDERAL AVIATION AGENCY
WASHINGTON, D.C.

Civil Air Regulations Amendment 13-5
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[Reg. Docket No. 1141; Amdt. No. 13-5]

PART 13—AIRCRAFT ENGINE AIRWORTHINESS

30-Minute Power Rating for Helicopter Turbine Engines

A notice of proposed rule making was published in the FEDERAL REGISTER April 10, 1962 (27 F.R. 3405), and circulated to the industry as Draft Release 62-15 dated April 4, 1962. This draft release proposed to amend Part 13 of the Civil Air Regulations by establishing a new 30-minute power rating for helicopter engines and a new endurance test schedule to be required for substantiating the rating.

The rules being adopted establish a new 30-minute power rating for certain helicopter engines and a new endurance test schedule for substantiating the rating. These rules will provide for a higher power, to be used in complying with helicopter performance requirements. They will affect the manufacturer of the helicopter engine primarily since they involve changes to the type certification requirements for such engines..

The presently effective provisions of Part 7 of the Civil Air Regulations require that certain rotorcraft takeoff and en route climb performance determinations be made with one engine inoperative and remaining engines operating at maximum continuous power. Representations from the industry have been made that a higher power could be used in making these determinations without adversely affecting safety and that improved helicopter performance would result. It has been recommended that rated takeoff power, if used within practical limits, could be used in place of maximum continuous power.

In response to these representations, the Agency has recently authorized type certification of twin turbine-powered transport category helicopters using takeoff power, in lieu of maximum continuous power, in establishing climb performance. The use of such takeoff power is limited to periods not exceeding 30 minutes in duration.

At the same time the Agency indicated that this performance requirement as well as other more comprehensive requirements, presently under study, would be incorporated into existing Part 7 as soon as operating experience is obtained on the twin turbine-powered helicopters.

While the use of rated takeoff power by the helicopter manufacturers for the establishment of certain performance data for their twin turbine-powered helicopters results in the substantiation of such power for turbine engines installed in their helicopters, the Agency believes that in the future such substantiation should be accomplished prior to type certification and subsequent installation of the engine. While engine manufacturers may now substantiate their turbine engines for takeoff power for 30 minutes duration, the present rules do not specifically provide for a 30-minute power rating. Therefore, it is considered appropriate to amend the provisions of Part 13 to provide for the substantiation of turbine engines used in helicopters for this higher power during type certification of such engines where a rating at this higher power is desired. Accordingly, Part 13 is being amended by defining and adding a new rating of "30-minute power," which will be limited to periods of use not exceeding 30 minutes duration. To insure reliable operation at this power, a new test schedule is being added to § 13.254 for substantiating such power for turbine engines used in helicopters.

Comments on the draft release were received from interested persons and consideration has been given to all relevant matter presented. Several comments were received to the effect that the new rating should be optional and, in any case, applicable only to engines used in multiengine helicopters. The draft release provides that all helicopter turbine engines would be required to be type certificated in accordance with the new test schedule for the 30-minute power rating. The Agency concurs with these comments and the rating and test schedule are being made optional accordingly. Other comments calling attention to typographical or constructional errors in the draft release have also been accepted and appropriate changes have been made to the rules being amended.

A number of comments were made suggesting changes or additions which have not been incorporated in the rules being amended. One comment discussed the desirability of adopting, for commercial use, other special ratings used by the military services. Such ratings are not pertinent to the amendments as they were proposed and their inclusion is not warranted at this time. One comment requested deletion of the word "maximum" from the definition of 30-minute power. This deletion is not being made because it is intended that both takeoff power and 30-minute power would represent the maximum output at which the engine would be rated for type certification. There is presently in process a rule making action which would add the word "maximum" to takeoff power. This does not preclude the use of lower power in meeting helicopter performance certification requirements. In this connection, another comment considered the power level of the 30-minute rating indefinite, and that it could be declared higher than takeoff power by an engine manufacturer. It was also suggested that the rating be called a "contingency rating." The Agency considers that takeoff power and 30-minute power are properly defined for rating purposes. The question of whether the new rating should be termed "contingency power" was considered at length before publication of the draft release, and the Agency sees no purpose to be served by changing terminology at this time. Another comment considered the test schedule at 30-minute power to be inadequate, particularly in view of the relatively small amount of testing at maximum temperature. The comment recommended increasing the running time at takeoff power and at 30-minute power, and increasing the time at maximum temperature. The Agency believes that the periods of operation at various powers and temperatures represent reasonable minima for type certification and that consideration of increases in testing severity lie outside the scope of the problem at issue. Accordingly, no changes are being made to the test schedule as published in the draft release.

In consideration of the foregoing, Part 13 of the Civil Air Regulations (14 CFR Part 13, as amended) is hereby amended as follows, effective February 12, 1963:

1. By amending § 13.1(b) by redesignating subparagraphs (4) through (7) as (5) through (8) and by inserting a new subparagraph (4) to read as follows:

§ 13.1 Definitions.

* * * * *

(b) *General design.* * * *

(4) *30-minute power for helicopter turbine engines.* 30-minute power for helicopter turbine engines is the maximum brake horsepower, developed under static conditions at specified altitudes and atmospheric temperatures, under the maximum conditions of rotor shaft rotational speed and gas temperature, and limited in use to periods of not over 30 minutes as shown on the engine data sheet.

2. By amending § 13.254 by deleting from the first sentence the words "this section" and inserting in lieu thereof "either paragraph (a) or (b) of this section, whichever is applicable", by inserting after the introductory paragraph a new paragraph heading titled "(a) *All engines except helicopter engines for*

which a 30-minute rating is desired", by redesignating present paragraphs (a) through (g) as subparagraphs (1) through (7) of the redesignated paragraph (a), and by adding a new paragraph (b) to read as follows:

§ 13.254 Endurance test.

* * * * *

(a) *All engines except helicopter engines for which a 30-minute rating is desired.* (1) * * *

* * * * *

(b) *Helicopter engines for which a 30-minute rating is desired*—(1) *Takeoff and idling.* One hour of alternate 5-minute periods shall be conducted at takeoff power and thrust and at idling power and thrust. The developed powers and thrusts at takeoff and idling conditions and their corresponding rotor speed and gas temperature conditions shall be as established by the power control(s) in accordance with the schedule established by the manufacturer.

It shall be permissible to control manually during any one period the rotor speed and power and thrust while taking data to check performance. For engines with augmented takeoff ratings which involve increases in turbine inlet temperature, rotor speed, or shaft power, this period of running at rated takeoff power shall be at the augmented rating. In changing the power setting after each period, the power-control lever shall be moved in the manner prescribed in subparagraph (5) of this paragraph.

(2) *30-minute power.* Thirty minutes shall be conducted at 30-minute power and or thrust.

(3) *Maximum continuous power and thrust.* Two hours shall be conducted at the maximum continuous power and thrust.

(4) *Incremental cruise power and thrust.* Two hours shall be conducted at the successive power lever positions corresponding with not less than 12 approximately equal speed and time increments between maximum continuous engine rotational speed and ground or minimum idle rotational speed. For engines operating at constant speed, it shall be permissible to vary the thrust and power in lieu of speed. In the event significant peak vibrations exist anywhere between ground idle and maximum continuous conditions, the number of increments chosen shall be altered to increase the amount of running conducted while being subjected to the peak vibrations up to an amount not exceeding 50 percent of the total time spent in incremental running. (See also § 13.251.)

(5) *Acceleration and deceleration runs.* Thirty minutes shall be conducted of accelerations and decelerations consisting of 6 cycles from idling power and thrust to takeoff power and thrust and maintained at the takeoff power lever position for 30 seconds and at the idling power lever position for approximately 4½ minutes. In complying with the provisions of this subparagraph, the power-control lever shall be moved from one extreme position to the other in not more than one second except that, where different regimes of control operations are incorporated necessitating scheduling of the power-control lever, motion in going from one extreme position to the other, a longer period of time shall be acceptable but in no case shall this time exceed 2 seconds.

(6) *Starts.* One hundred starts shall be made, of which 25 starts shall be preceded by at least a 2-hour engine shutdown. Ten starts shall be false engine starts pausing for the applicant's specified minimum fuel drainage time before attempting a normal start. Ten starts shall be normal restarts, each performed not more than 15 minutes after engine shutdown. It shall be acceptable to make the remaining starts after completion of the 150 hours of endurance testing.

(7) *Maximum temperatures.* The limiting maximum hot gas and oil inlet temperatures shall be substantiated by operation at these limits during all the takeoff, 30-minute power, and maximum continuous running of the endurance test except where the test periods are not longer than 5 minutes and do not permit stabilization.

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

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N. E. HALABY,
Administrator.

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