

§ 35.5

accordance with appendix A to this part that are acceptable to the Administrator. The instructions may be incomplete at type certification if a program exists to ensure their completion prior to delivery of the first aircraft with the propeller installed, or upon issuance of a standard certificate of airworthiness for an aircraft with the propeller installed, whichever occurs later.

[Amdt. 35-5, 45 FR 60181, Sept. 11, 1980]

§ 35.5 Propeller operating limitations.

Propeller operating limitations are established by the Administrator, are included in the propeller type certificate data sheet specified in § 21.41 of this chapter, and include limitations based on the operating conditions demonstrated during the tests required by this part and any other information found necessary for the safe operation of the propeller.

[Amdt. 35-5, 45 FR 60182, Sept. 11, 1980]

Subpart B—Design and Construction

§ 35.11 Applicability.

This subpart prescribes the design and construction requirements for propellers.

§ 35.13 General.

Each applicant must show that the propeller concerned meets the design and construction requirements of this subpart.

§ 35.15 Design features.

The propeller may not have design features that experience has shown to be hazardous or unreliable. The suitability of each questionable design detail or part must be established by tests.

§ 35.17 Materials.

The suitability and durability of materials used in the propeller must—

(a) Be established on the basis of experience or tests; and

(b) Conform to approved specifications (such as industry or military specifications, or Technical Standard Orders) that ensure their having the

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strength and other properties assumed in the design data.

(Secs. 313(a), 601, and 603, 72 Stat. 752, 775, 49 U.S.C. 1354(a), 1421, and 1423; sec. 6(c), 49 U.S.C. 1655(c))

[Amdt. 35-4, 42 FR 15047, Mar. 17, 1977]

§ 35.19 Durability.

Each part of the propeller must be designed and constructed to minimize the development of any unsafe condition of the propeller between overhaul periods.

§ 35.21 Reversible propellers.

A reversible propeller must be adaptable for use with a reversing system in an airplane so that no single failure or malfunction in that system during normal or emergency operation will result in unwanted travel of the propeller blades to a position substantially below the normal flight low-pitch stop. Failure of structural elements need not be considered if the occurrence of such a failure is expected to be extremely remote. For the purposes of this section the term “reversing system” means that part of the complete reversing system that is in the propeller itself and those other parts that are supplied by the applicant for installation in the aircraft.

§ 35.23 Pitch control and indication.

(a) No loss of normal propeller pitch control may cause hazardous overspeeding of the propeller under intended operating conditions.

(b) Each pitch control system that is within the propeller, or supplied with the propeller, and that uses engine oil for feathering, must incorporate means to override or bypass the normally operative hydraulic system components so as to allow feathering if those components fail or malfunction.

(c) Each propeller approved for installation on a turbopropeller engine must incorporate a provision for an indicator to indicate when the propeller blade angle is below the flight low pitch position. The provision must directly sense the blade position and be arranged to cause an indicator to indicate that the blade angle is below the flight low pitch position before the

blade moves more than 8° below the flight low pitch stop.

[Amdt. 35-2, 32 FR 3737, Mar. 4, 1967, as amended by Amdt. 35-5, 45 FR 60182, Sept. 11, 1980]

Subpart C—Tests and Inspections

§ 35.31 Applicability.

This subpart prescribes the tests and inspections for propellers and their essential accessories.

§ 35.33 General.

(a) Each applicant must show that the propeller concerned and its essential accessories complete the tests and inspections of this subpart without evidence of failure or malfunction.

(b) Each applicant must furnish testing facilities, including equipment, and competent personnel, to conduct the required tests.

§ 35.35 Blade retention test.

The hub and blade retention arrangement of propellers with detachable blades must be subjected to a centrifugal load of twice the maximum centrifugal force to which the propeller would be subjected during operations within the limitations established for the propeller. This may be done by either a whirl test or a static pull test.

(Secs. 313(a), 601, and 603, 72 Stat. 752, 775, 49 U.S.C. 1354(a), 1421, and 1423; sec. 6(c), 49 U.S.C. 1655(c))

[Amdt. 35-4, 42 FR 15047, Mar. 17, 1977]

§ 35.37 Fatigue limit tests.

A fatigue evaluation must be made and the fatigue limits determined for each metallic hub and blade, and each primary load carrying metal component of nonmetallic blades. The fatigue evaluation must include consideration of all reasonably foreseeable vibration load patterns. The fatigue limits must account for the permissible service deterioration (such as nicks, grooves, galling, bearing wear, and variations in material properties).

[Amdt. 35-5, 45 FR 60182, Sept. 11, 1980]

§ 35.39 Endurance test.

(a) *Fixed-pitch wood propellers.* Fixed-pitch wood propellers must be subjected to one of the following tests:

(1) A 10-hour endurance block test on an engine with a propeller of the greatest pitch and diameter for which certification is sought at the rated rotational speed.

(2) A 50-hour flight test in level flight or in climb. At least five hours of this flight test must be with the propeller operated at the rated rotational speed, and the remainder of the 50 hours must be with the propeller operated at not less than 90 percent of the rated rotational speed. This test must be conducted on a propeller of the greatest diameter for which certification is requested.

(3) A 50-hour endurance block test on an engine at the power and propeller rotational speed for which certification is sought. This test must be conducted on a propeller of the greatest diameter for which certification is requested.

(b) *Fixed-pitch metal propellers and ground adjustable-pitch propellers.* Each fixed-pitch metal propeller or ground adjustable-pitch propeller must be subjected to the test prescribed in either paragraph (a)(2) or (a)(3) of this section.

(c) *Variable-pitch propellers.* Compliance with this paragraph must be shown for a propeller of the greatest diameter for which certification is requested. Each variable-pitch propeller (a propeller the pitch setting of which can be changed by the flight crew or by automatic means while the propeller is rotating) must be subjected to one of the following tests:

(1) A 100-hour test on a representative engine with the same or higher power and rotational speed and the same or more severe vibration characteristics as the engine with which the propeller is to be used. Each test must be made at the maximum continuous rotational speed and power rating of the propeller. If a takeoff rating greater than the maximum continuous rating is to be established, and additional 10-hour block test must be made at the maximum power and rotational speed for the takeoff rating.

(2) Operation of the propeller throughout the engine endurance tests