§ 35.17 Materials and manufacturing methods.

(a) The suitability and durability of materials used in the propeller must:

(1) Be established on the basis of experience, tests, or both.

(2) Account for environmental conditions expected in service.

(b) All materials and manufacturing methods must conform to specifications acceptable to the Administrator.

(c) The design values of properties of materials must be suitably related to the most adverse properties stated in the material specification for applicable conditions expected in service.

[Amdt. No. 35–8, 73 FR 63347, Oct. 24, 2008]

§ 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 Variable and reversible pitch propellers.

(a) No single failure or malfunction in the propeller system will result in unintended travel of the propeller blades to a position below the in-flight low-pitch position. The extent of any intended travel below the in-flight low-pitch position must be documented by the applicant in the appropriate manuals. Failure of structural elements need not be considered if the occurrence of such a failure is shown to be extremely remote under § 35.15.

(b) For propellers incorporating a method to select blade pitch below the in-flight low pitch position, provisions must be made to sense and indicate to the flight crew that the propeller blades are below that position by an amount defined in the installation manual. The method for sensing and indicating the propeller blade pitch position must be such that its failure does not affect the control of the propeller.

[Amdt. No. 35–8, 73 FR 63347, Oct. 24, 2008]

§ 35.22 Feathering propellers.

(a) Feathering propellers are intended to feather from all flight conditions, taking into account expected wear and leakage. Any feathering and unfeathering limitations must be documented in the appropriate manuals.

(b) Propeller pitch control systems that use engine oil to feather must incorporate a method to allow the propeller to feather if the engine oil system fails.

(c) Feathering propellers must be designed to be capable of unfeathering after the propeller system has stabilized to the minimum declared outside air temperature.

[Amdt. No. 35–8, 73 FR 63347, Oct. 24, 2008]

§ 35.23 Propeller control system.

The requirements of this section apply to any system or component that controls, limits or monitors propeller functions.

(a) The propeller control system must be designed, constructed and validated to show that:

(1) The propeller control system, operating in normal and alternative operating modes and in transition between operating modes, performs the functions defined by the applicant throughout the declared operating conditions and flight envelope.

(2) The propeller control system functionality is not adversely affected by the declared environmental conditions, including temperature, electromagnetic interference (EMI), high intensity radiated fields (HIRF) and lightning. The environmental limits to which the system has been satisfactorily validated must be documented in the appropriate propeller manuals.

(3) A method is provided to indicate that an operating mode change has occurred if flight crew action is required. In such an event, operating instructions must be provided in the appropriate manuals.

(b) The propeller control system must be designed and constructed so that, in addition to compliance with § 35.15:

(1) No single failure or malfunction of electrical or electronic components in the control system results in a hazardous propeller effect.

(2) Failures or malfunctions directly affecting the propeller control system in a typical airplane, such as structural failures of attachments to the control, fire, or overheat, do not lead to a hazardous propeller effect.

(3) The loss of normal propeller pitch control does not cause a hazardous propeller effect under the intended operating conditions.

(4) The failure or corruption of data or signals shared across propellers does not cause a hazardous propeller effect.

(c) Electronic propeller control system imbedded software must be designed and implemented by a method approved by the Administrator that is consistent with the criticality of the performed functions and that minimizes the existence of software errors.

(d) The propeller control system must be designed and constructed so that the failure or corruption of airplane-supplied data does not result in hazardous propeller effects.

(e) The propeller control system must be designed and constructed so that the loss, interruption or abnormal characteristic of airplane-supplied electrical power does not result in hazardous propeller effects. The power quality requirements must be described in the appropriate manuals.

[Amdt. No. 35–8, 73 FR 63347, Oct. 24, 2008]

§ 35.24 Strength.

The maximum stresses developed in the propeller may not exceed values acceptable to the Administrator considering the particular form of construction and the most severe operating conditions.

[Amdt. No. 35–8, 73 FR 63348, Oct. 24, 2008]

Subpart C—Tests and Inspections

§ 35.31 [Reserved]≤

§ 35.33 General.

(a) Each applicant must furnish test article(s) and suitable testing facilities, including equipment and competent personnel, and conduct the required tests in accordance with part 21 of this chapter.

(b) All automatic controls and safety systems must be in operation unless it is accepted by the Administrator as impossible or not required because of the nature of the test. If needed for substantiation, the applicant may test a different propeller configuration if this does not constitute a less severe test.

(c) Any systems or components that cannot be adequately substantiated by the applicant to the requirements of this part are required to undergo additional tests or analysis to demonstrate that the systems or components are able to perform their intended functions in all declared environmental and operating conditions.

[Amdt. No. 35–8, 73 FR 63348, Oct. 24, 2008]

§ 35.34 Inspections, adjustments and repairs.

(a) Before and after conducting the tests prescribed in this part, the test article must be subjected to an inspection, and a record must be made of all the relevant parameters, calibrations and settings.

(b) During all tests, only servicing and minor repairs are permitted. If major repairs or part replacement is required, the Administrator must approve the repair or part replacement prior to implementation and may require additional testing. Any unscheduled repair or action on the test article must be recorded and reported.

[Amdt. No. 35–8, 73 FR 63348, Oct. 24, 2008]

§ 35.35 Centrifugal load tests.

The applicant must demonstrate that a propeller complies with paragraphs (a), (b) and (c) of this section without evidence of failure, malfunction, or permanent deformation that would result in a major or hazardous propeller effect. When the propeller could be sensitive to environmental degradation in service, this must be considered. This section does not apply to fixed-pitch wood or fixed-pitch metal propellers of conventional design.

(a) The hub, blade retention system, and counterweights must be tested for a period of one hour to a load equivalent to twice the maximum centrifugal load to which the propeller would be subjected during operation at the maximum rated rotational speed.

(b) Blade features associated with transitions to the retention system (for example, a composite blade bonded to a metallic retention) must be tested either during the test of paragraph (a) of this section or in a separate component test for a period of one hour to a load