

malfunction that could prevent safe flight and landing of the airplane, or affect the ability of the crew to cope with adverse operating conditions.

(4) Corrective actions for all problems discovered during the development and certification test program that could affect the safety of ETOPS operations, or the intended function of systems whose use is relied upon to accomplish the ETOPS mission, must be identified and implemented in accordance with paragraph (g)(2). If, during the certification program, it is discovered that a fault has developed that requires significant rework of manufacturing, maintenance, and/or operational procedures, the FAA will review the ETOPS suitability of the affected system and interfacing hardware and identify any additional actions to be accomplished to substantiate the corrective actions.

(5) For each engine type to be certificated with the airplane, the system must include provisions for an accelerated engine cyclic endurance test program that will accumulate cycles on one representative production-equivalent propulsion system in advance of the high-cycle revenue fleet engine. This test program will assist the applicant and the FAA in identifying and correcting problems before they occur in revenue service. This program must be in place for, at a minimum, the first 250,000 engine-hours of fleet operating experience after the airplane enters revenue service. The representative production-equivalent propulsion system may, at the manufacturer's discretion, be used for other fleet support activities.

(g) *Reliability Assessment Board.*

(1) An FAA Reliability Assessment Board will be formed to evaluate the suitability of the airplane for ETOPS approval and make a recommendation to the Manager, Transport Airplane Directorate, regarding the adequacy of the type design for 180-minute ETOPS operation. The purpose of this board will be:

(i) To periodically review the development and certification flight test program accomplishments from both type design and operational perspectives;

(ii) To ensure that all specific problems, as well as their implications on the effectiveness of the Early ETOPS process, are resolved; and

(iii) To assess the design suitability for ETOPS. The board will consider design, maintenance, manufacturing, and operational aspects of the type design when finding suitability for ETOPS approval.

(2) The FAA Reliability Assessment Board will review and evaluate the data from the problem tracking and resolution system to establish compliance with the requirements of paragraph (h). The board will evaluate the overall type design for ETOPS suitability as demonstrated in flight test, and the *Airplane Demonstration Test*, considering all resolutions of problems. The following suitability criteria will be applied:

(i) Sources of engine shutdown/thrust loss, engine anomalies, or airplane system problems that have a potential significant adverse effect on in-service safety will be resolved.

(ii) Resolutions are identified for all items in paragraph (i) with analysis and/or testing to show all resolutions are effective. These resolutions may be accomplished through one or more of the following categories: Design change, Operating procedure revision, Maintenance procedure revision, Manufacturing change.

(iii) The resolutions of paragraphs (i) and (ii) will be incorporated prior to entry into service.

(iv) The engine shutdown history of the test program indicates that the engine reliability of the configuration is suitable for the ETOPS approval being considered.

(v) Where interim resolutions having operational impact are defined, the cumulative effect must be determined to be acceptable.

(vi) System or component failures experienced during the program are consistent with the assumptions made in the failure analyses.

(h) *Reliability Demonstration Acceptance Criteria.*

(1) For the engine and airplane systems, the type and frequency of failures that occur during the airplane flight test program and the *Airplane Demonstration Test* must be consistent with the type and frequency of failures or malfunctions that would be expected to occur on presently certified 180-minute ETOPS airplanes. The failures to be considered are those associated with system components that conform to the type design requested for certification. The Reliability Assessment Board will determine compliance with this requirement based on an evaluation of the problem reporting system data, considering system redundancies, failure significance, problem resolution, and engineering judgment.

(2) Corrective action for any of the following classes of problems occurring during the testing identified in paragraph (h)(1) that requires a major system redesign would delay ETOPS type design approval, or result in

approval of a reduced single-engine diversion time, unless corrective action has been substantiated to, and accepted by, the FAA Reliability Assessment Board:

(i) Any source of unplanned inflight shutdown or loss of thrust.

(ii) Any problem that jeopardizes the safety of an airplane diversion.

(3) The FAA Reliability Assessment Board must determine that the suitability criteria of paragraph (g)(2) have been met.

(i) *Demonstration of Compliance.* In order to be eligible for 180-minute ETOPS type design approval, the following conditions apply:

(1) The engine assessment has been completed and eligibility for ETOPS operation has been approved by the FAA Engine Certification Office.

(2) All design, manufacturing, maintenance, operational, and other features necessary to meet the ETOPS requirements of paragraph (c)(1), and to resolve the problems identified in paragraph (c)(2), have been successfully implemented.

(3) The identified test and analysis features in paragraph (c)(4) and (c)(5) have been shown to be effective in validating the successful implementation of the features in paragraph (i)(2).

(4) The additional analysis requirements of paragraph (d) have been completed and the results have been approved.

(5) The additional test requirements of paragraph (e) have been successfully completed.

(6) All significant problems identified in accordance with paragraph (f) have been resolved, and fixes substantiated to be effective have been implemented.

(7) The accelerated engine cyclic endurance test program of paragraph (f)(5) must be in place.

(8) Compliance with the reliability demonstration acceptance criteria of paragraph (h) has been found by the Reliability Assessment Board.

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