

III(b)(2) New Technology Demonstration Testing

The applicant would have to validate all ETOPS significant systems maintenance and operational procedures. Any problems found would have to be tracked and resolved through the problem tracking system and resolution system proposed in paragraph III(b)(5).

Explanation

The explanation for this proposed paragraph is the same as for proposed paragraph II(b)(5).

III(b)(3) APU Validation Test

This paragraph would require an applicant to complete a test consisting of 3,000 equivalent airplane operational cycles on an auxiliary power unit that the applicant uses to comply with the electrical power supply system requirements of paragraph I(a)(2) of this proposed appendix.

Explanation

The explanation for this proposed paragraph is the same as for proposed paragraph II(b)(6).

III(b)(4) Airplane Demonstration Test

This paragraph would require the applicant to conduct an airplane flight test to demonstrate that the airplane, its components and equipment are capable of and function properly during ETOPS and ETOPS diversions. This flight test may be coordinated with, but would not be in place of the function and reliability flight testing required for compliance with § 21.35(b)(2).

The proposed requirement includes several conditions that the applicant would have to comply with in conducting this test. Among these are:

- (1) The flight test program would have to include:
 - (i) flights simulating actual ETOPS operation;
 - (ii) demonstration of maximum normal flight duration with maximum diversions;
 - (iii) maximum time engine inoperative diversions;
 - (iv) non-normal conditions to demonstrate the airplanes capability to safely conduct and ETOPS diversion;
 - (v) diversions into representative operational diversionary airports; and
 - (vi) repeated exposure to humid and inclement weather on the ground followed by long-range operations at normal cruise altitude.
- (2) The flight testing would have to validate the adequacy of the

airplane's flying qualities, performance and the flight crew's ability to deal with adverse operating conditions.

- (3) The engine-inoperative diversions would have to be evenly distributed among the number of engines in the applicant's flight test program.
- (4) The test airplane would have to be operated and maintained using the recommended operations and maintenance manual procedures during the test.
- (5) At the completion of the test, the ETOPS Group 1 significant systems would have to undergo an airplane visual inspection and the engines would have to also undergo an internal gas path inspection.

Explanation

The explanation for this proposed paragraph is the same as for proposed paragraph II(b)(7).

III(b)(5) Problem Tracking and Resolution System

This paragraph would require the applicant to establish a problem tracking and resolution system to address problems, as identified in proposed section 21.4(a)(5), encountered on ETOPS significant systems during airplane and engine testing that could affect the safety of ETOPS operations.

Explanation

The explanation for this proposed paragraph is the same as for proposed paragraph II(b)(8).

III(b)(6) Reliability Demonstration Acceptance Criteria

The applicant would have to show that the type and frequency of failures that occur during the airplane flight test program and the airplane demonstration test proposed by paragraph III(b)(4), are consistent with the type and frequency of failures or malfunctions that would be expected to occur on presently certified ETOPS airplanes, or any non-ETOPS derivative models of those aircraft or engines.

Explanation

As discussed above for proposed paragraph II(b)(9), the original ARAC draft did not differentiate between two engine airplanes from airplanes with more than two engines in the applicability of the type and frequency requirement. The ARAC proposal for this paragraph included the added phrase "or any non-ETOPS derivative models of those airplanes or engines" for those airplanes and engines that could be included in this comparison of

reliability. As we discussed above for proposed paragraph II(b)(9), we have deleted this phrase from the proposed rule for two engine airplanes because an applicant would not necessarily have to do the comparison to previously approved airplanes manufactured by that applicant. We are now proposing to separately state the requirements for airplanes with more than two engines in proposed section III of Appendix L. We have retained this provision in the proposed requirement for airplanes with more than two engines in paragraph III(b)(6) since previous ETOPS experience may not exist on airplanes with more than two engines at the time this proposed rule becomes effective.

III(c) Combined Service Experience and Early ETOPS Method

Explanation

With the exception of any specific propulsion system requirements that are being applied to airplanes with more than two engines as discussed above, the explanation for proposed section III(c) is the same as for proposed section II(c).

Part 33

Global Issues for Part 33

The overall philosophy behind ETOPS type design approval is to build upon the improved reliability observed in today's engines, resulting in an even higher level of reliability for future engine products. However, the FAA recognizes that even with the advances in design and manufacturing technology, loss of thrust control (LOTC), in-flight shutdown (IFSD), or other power loss events will continue to occur. Therefore the overall intent of these ETOPS type design requirements are to minimize the likelihood of an engine power loss during ETOPS operations.

Specifically, the part 33 ETOPS related amendments require the engine manufacturers to use their best design and manufacturing practices, skills and lessons learned in designing and manufacturing the new product. The intent is to eliminate from the design all known ETOPS relevant failures, malfunctions, or design related maintenance errors experienced in their other relevant FAA certified engine models. These failures include but are not limited to loss of thrust control, in-flight shutdown, or other power loss events.

It is important to note that complying with the part 33 ETOPS requirements for certification makes the product "eligible" for ETOPS operation only, and in no way implies an approval