

In the early ETOPS method proposed in section II(b), the reliability demonstration acceptance criteria provides a way to compare the airplane flight test history to existing ETOPS approved airplanes as a way to assess design suitability. Without some defined criteria for assessing the suitability of a design for ETOPS approval, we would have no way of determining if a candidate airplane were acceptable when an applicant chooses to use the combined approach. Therefore, we have added the reliability demonstration acceptance criteria requirement to proposed paragraph II(c)(1). Since we consider this to be a significant departure from ARAC's original recommendation and ARAC did not clearly state their intent for this section, we request specific comments on this particular proposal.

The second method for reduced service experience proposed in paragraph II(c)(2) would allow some level of service experience other than 15,000 engine hours, provided the applicant defines compensating factors that provide an equivalent level of safety to that provided using any of the other methods. This method would allow an applicant some latitude to create an ETOPS approval program tailored to the unique aspects of the airplane model.

Section III—Airplanes With More Than Two Engines

In addition to the requirements of section I, an applicant for an airplane with more than two engines would have to show compliance with the proposed requirements of section III.

Explanation

This section of Appendix L would define those specific requirements that would be applicable to airplanes with more than two engines. In order to achieve an equivalent risk of a critical loss of thrust during an ETOPS flight due to independent failure causes, the in-flight shutdown rate for twins needs to be ten times lower than four engine airplanes and 20 times lower than three engine airplanes to achieve an equivalent level of safety for ETOPS. For maximum diversion times greater than 180 minutes, the proposed standard for two engine airplanes is 0.01 shutdowns per 1,000 engine-hours. The associated in-flight shutdown rate to achieve the same level of safety would be 0.2 for three engine airplanes and 0.1 for four engine airplanes. These levels of reliability are inherent in current generation turbine engines without the need for specific propulsion system requirements beyond those now in parts

33 and 25. The FAA is concerned that we may inadvertently encourage a lower standard than is already normally achieved by specifying these high in-flight shutdown rates in the proposed rule for three and four engine airplanes. Therefore, we have not included any of the proposed propulsion system requirements that would be applicable to two engine airplanes into proposed Appendix L, section III.

What remains for section III are the proposed airplane level system requirements from section II including a flight test demonstration of airplane and propulsion system capability during a maximum ETOPS diversion. Since we are equally concerned about human error caused critical multiple failures for airplanes with more than two engines as we are for twins, we are also proposing a maintenance and operational procedure validation requirement in section III. Except as noted, the explanation for each of the proposed paragraphs in section III is the same as for section II.

III(a) Service Experience Method

The applicant would have to demonstrate that the airplane and engine combination for which approval is sought has the required airplane and propulsion system capability to safely conduct an ETOPS mission and maximum diversion and has achieved required airplane system reliability based upon fleet in-service experience.

Explanation

This proposed requirement is the same as in section II with the exception that "propulsion system" has been removed from the last phrase of the proposed requirement. Otherwise, the explanation is the same as for paragraph II(a).

III(a)(1) Required Service Experience

This paragraph would require that an applicant who desires to obtain ETOPS type design approval using service experience conduct a reliability review after accumulating 250,000 worldwide fleet engine hours on the airplane and engine combination for which approval is being sought. The number of hours would be allowed to be reduced if adequate compensating factors are identified which give a reasonable equivalent database. A significant portion of the 250,000 engine hours would have to be obtained on the candidate airplane.

Explanation

The explanation for this proposed paragraph is the same as for proposed paragraph II(a)(1).

III(a)(2) Airplane Systems Assessment

The applicant would have to show compliance with section 25.1535(a) using available in-service reliability data for ETOPS significant systems. The applicant would have to identify corrective actions for all causes or potential causes of ETOPS significant system failures occurring in service that are shown to be effective in preventing future occurrences.

Explanation

The explanation for this proposed paragraph is the same as for proposed paragraph II(a)(3).

III(a)(3) Airplane Flight Test Requirements

This paragraph would require a flight test to validate the adequacy of the airplane's flying qualities, performance and the flight crew's ability to deal with engine inoperative and non-normal worst case system failure conditions expected to occur in service.

Explanation

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

III(b) Early ETOPS Method

This part of section II defines requirements that an applicant would have to comply with to certify an airplane for ETOPS without first accumulating the service experience that would be required in section III(a).

Explanation

Proposed section III(b) is the same as proposed section II(b) except that the relevant experience assessment and propulsion system design requirements have been removed from the proposed section III requirements. Otherwise, the explanation is the same as for paragraph II(b).

III(b)(1) Maintenance and Operational Procedures

Under this proposed requirement, the applicant would have to validate maintenance and operational procedures for ETOPS Significant Systems. The applicant would have to track and resolve any problems discovered during the validation process using the proposed Problem Tracking and Resolution System as described by paragraph (b)(5).

Explanation

The explanation for this proposed paragraph is the same as for proposed paragraph II(b)(3).