

range flight, and a number of engine-inoperative diversions. As such, the FAA proposes that the specific test conditions described in the subparagraphs to proposed paragraph II(b)(7) more clearly state the objectives of the test program. Those objectives include demonstrations that the aircraft, its components, and equipment are capable of and function properly during long-range operations and airplane diversions, including engine-inoperative diversions.

This change in focus constitutes a significant departure from the original purpose of the 1,000-cycle airplane demonstration test requirement discussed in the preamble to the Boeing Model 777 ETOPS special conditions. However, the proposed changes to the 3,000 cycle test requirement and the airplane demonstration test that we propose for this rule would provide an overall better evaluation of a new airplane design for ETOPS approval.

The original ARAC proposal recommended the following wording for paragraph II(b)(7)(i)(4): “Non-normal conditions to demonstrate the airplane’s capability to safely conduct an ETOPS diversion under worst case probable system failure conditions.” This is similar language for a flight test demonstration of non-normal operating conditions to Section III—Airplanes with more than two engines that proposed for paragraph II(a)(5). For similar reasons to those in the explanation for paragraph II(a)(5), we have deleted the word “probable” in proposed paragraph II(b)(7)(i)(4) and replaced it with system failure conditions “expected to occur in service” in the proposed rule.

Human error continues to be a major cause of engine in-flight shutdowns and forced airplane diversions. The proposed requirement in paragraph II(b)(7)(iv) to operate and maintain the test airplane using the recommended operations and maintenance manual procedures, combined with the proposed maintenance validation requirement in paragraph II(b)(3), are part of the FAA’s overall regulatory objective to minimize human errors in the ETOPS rule. The FAA intends that the proposed ETOPS type design requirements would result in an airplane entering service with validated maintenance and operational procedures that minimize the possibility of human error in ETOPS operations.

During the certification of the B777 for early ETOPS, the special conditions required that the airplane demonstration test be conducted using the airline maintenance and operations manuals. The purpose of this requirement was

three-fold: (1) To assure that the airplane test was as close to an airline simulation as possible, (2) to assure that the maintenance and operations products were mature at entry into service, and (3) to assure that no maintenance or operations procedures would erroneously contribute to system failures.

In developing their draft rule, the ARAC ETOPS Working Group fully concurred with the proposed requirement to assure maintenance and operational product maturity at entry into service. However, the working group also recognized that validation of these products could be accomplished in different fashions. Nonetheless, ARAC noted that the proposed associated advisory circular (AC) recommends that the maintenance manual should be used for all testing necessary for ETOPS validation (component, engine and airplane). Tasks such as LRU replacement, testing following removal/replacement of parts, etc., must be validated per the requirements of the rule. The proposed AC does provide amplification, however, on what maintenance manual sections should be validated, namely only those sections pertinent to Groups 1 and 2 ETOPS significant systems. For instance, while validation of a landing gear maintenance task may be prudent for product readiness, the landing gear is not considered ETOPS critical, and therefore validation of related maintenance procedures would not be required.

As we said in the discussion for the proposed 3,000 cycle test requirement in paragraph II(b)(4), the FAA has concluded from a review of in-service experience of the Model 777 series airplanes that the 3,000-cycle engine and propulsion system test in proposed paragraph II(b)(4) of Appendix L and § 33.200(c) provides an adequate opportunity to discover cyclic-related failure modes associated with the design, provided that the engine and airplane manufacturers conduct an adequate post-test evaluation. For similar reasons, proposed subparagraph II(b)(7)(v) would require a post-test external and internal visual inspection of the airplane demonstration test engines and propulsion system hardware. The applicant would have to identify, track and resolve any abnormal conditions found during these inspections in accordance with the provisions of the proposed problem tracking and resolution system requirement of paragraph II(b)(8).

The proposed paragraph II(b)(7)(v) would require the manufacturer to visually inspect the airplane ETOPS

significant systems per the Instructions for Continued Airworthiness of section 25.1529 following the airplane demonstration test. The stated objective for this inspection in the proposed rule is to identify any abnormal conditions that could result in an in-flight shutdown or diversion. We have proposed this paragraph as ARAC recommended. However, many of the airplane ETOPS significant systems have components that are not amenable to visual inspection. An example is an electronic controller for airplane electrical load management. We request comments on this specific aspect of the proposed rule. If a visual inspection alone is not a sufficient post-test inspection requirement, what additional post-test inspections or tests should be incorporated into the final rule? If certain ETOPS significant systems should not be covered by this post-test inspection requirement, then what should be the criteria in the final rule for their exclusion? We invite commenters to respond to other commenters’ suggestions because the FAA may select one or more commenter recommended approaches for the final rule.

The FAA proposed a change to the airplane demonstration flight test requirement in a revision to the Boeing Model 777 ETOPS special conditions for the Model 777–300ER type certification program. The ARAC ETOPS Working Group had knowledge of our intent to revise the Model 777 ETOPS special conditions in this manner as they developed their recommendations. We have provided a more detailed justification of the airplane demonstration test requirement changes proposed in this notice in the preamble for that special conditions revision.

II(b)(8) 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 21.4(a)(5), encountered on ETOPS significant systems during airplane and engine testing that could affect the safety of ETOPS operations.

Explanation. This paragraph would codify the problem tracking system requirements of paragraph (f) from the Boeing Model 777 ETOPS special conditions.

The special conditions problem tracking system requirement is divided into two parts: the problem tracking/reporting required during type certification testing, and that required during the “early ETOPS” period of the first 250,000 hours of operation after the