

in, an IFSD or diversion. The applicant must include in this assessment relevant problems with similar or identical equipment installed on other types of airplanes to the extent such information is reasonably available.

(e) *Airplane flight test.* The applicant must conduct a flight test to validate the flightcrew's ability to safely conduct an ETOPS diversion with an inoperative engine and worst-case ETOPS Significant System failures and malfunctions that could occur in service. The flight test must validate the airplane's flying qualities and performance with the demonstrated failures and malfunctions.

**K25.2.2 Early ETOPS method.**

An applicant for ETOPS type design approval using the Early ETOPS method must comply with the following requirements:

(a) *Assessment of relevant experience with airplanes previously certificated under part 25.* The applicant must identify specific corrective actions taken on the candidate airplane to prevent relevant design, manufacturing, operational, and maintenance problems experienced on airplanes previously certificated under part 25 manufactured by the applicant. Specific corrective actions are not required if the nature of a problem is such that the problem would not significantly impact the safety or reliability of the airplane system involved. A relevant problem is a problem with an ETOPS group 1 significant system that has or could result in an IFSD or diversion. The applicant must include in this assessment relevant problems of supplier-provided ETOPS group 1 significant systems and similar or identical equipment used on airplanes built by other manufacturers to the extent such information is reasonably available.

(b) *Propulsion system design.* (1) The engine used in the applicant's airplane design must be approved as eligible for Early ETOPS in accordance with §33.201 of this chapter.

(2) The applicant must design the propulsion system to preclude failures or malfunctions that could result in an IFSD. The applicant must show compliance with this requirement by analysis, test, in-service experience on other airplanes, or other means acceptable to the FAA. If analysis is used, the applicant must show that the propulsion system design will minimize failures and malfunctions with the objective of achieving the following IFSD rates:

(i) An IFSD rate of 0.02 or less per 1,000 world-fleet engine-hours for type design approval up to and including 180 minutes.

(ii) An IFSD rate of 0.01 or less per 1,000 world-fleet engine-hours for type design approval beyond 180 minutes.

(c) *Maintenance and operational procedures.* The applicant must validate all maintenance and operational procedures for ETOPS significant systems. The applicant must identify, track, and resolve any problems found

during the validation in accordance with the problem tracking and resolution system specified in section K25.2.2(h) of this appendix.

(d) *Propulsion system validation test.* (1) The installed engine configuration for which approval is being sought must comply with §33.201(c) of this chapter. The test engine must be configured with a complete airplane nacelle package, including engine-mounted equipment, except for any configuration differences necessary to accommodate test stand interfaces with the engine nacelle package. At the conclusion of the test, the propulsion system must be—

(i) Visually inspected according to the applicant's on-wing inspection recommendations and limits; and

(ii) Completely disassembled and the propulsion system hardware inspected to determine whether it meets the service limits specified in the Instructions for Continued Airworthiness submitted in compliance with §25.1529.

(2) The applicant must identify, track, and resolve each cause or potential cause of IFSD, loss of thrust control, or other power loss encountered during this inspection in accordance with the problem tracking and resolution system specified in section K25.2.2 (h) of this appendix.

(e) *New technology testing.* Technology new to the applicant, including substantially new manufacturing techniques, must be tested to substantiate its suitability for the airplane design.

(f) *APU validation test.* If an APU is needed to comply with this appendix, one APU of the type to be certified with the airplane must be tested for 3,000 equivalent airplane operational cycles. Following completion of the test, the APU must be disassembled and inspected. The applicant must identify, track, and resolve each cause or potential cause of an inability to start or operate the APU in flight as intended in accordance with the problem tracking and resolution system specified in section K25.2.2(h) of this appendix.

(g) *Airplane demonstration.* For each airplane-engine combination to be approved for ETOPS, the applicant must flight test at least one airplane to demonstrate that the airplane, and its components and equipment are capable of functioning properly during ETOPS flights and diversions of the longest duration for which the applicant seeks approval. This flight testing may be performed in conjunction with, but may not substitute for the flight testing required by §21.35(b)(2) of this chapter.

(1) The airplane demonstration flight test program must include:

(i) Flights simulating actual ETOPS, including flight at normal cruise altitude, step climbs, and, if applicable, APU operation.