

# **Proposed Temporary Deviation on CS-E 1040 – ETOPS, Interim Conditions**

## **Introductory Note**

The following Temporary Deviation has been classified as an important Temporary Deviation and as such shall be subject to public consultation in accordance with EASA Management Board decision 12/2007 dated 11 September 2007, Article 3 (2.) of which states:

"2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency".

## **Statement of Issue**

The Applicant had requested approval in accordance with CS-E 1040 "ETOPS" for a diversion time of 405 minutes (a further 15 minutes for approach and landing is assumed), choosing to follow the means of compliance for "Early ETOPS" capability outlined by AMC 20-6 rev 2. However the programme has encountered unforeseen circumstances leading to the failure to complete the ETOPS compliance plan before entry into service of the engine, in the following respects:

- the complete disassembly and inspection of Appendix 1, 2., b. (1) (see above extract) has not been carried out,
- full test demonstration for the IP and LP turbine has not been shown.

On the grounds of the unforeseen nature of the programme disruption, The Applicant is requesting an interim ETOPS approval for a limited duration.

### **Agency Position**

The failure to show full compliance for the turbines and also failure to demonstrate no impending IFSD cause (from a detailed strip examination) at 3000 cycles life are seen as a reduction in the confidence which is normally required for full ETOPS approval. This situation requires compensation by mitigation measures. Two aspects to the mitigation are to be considered: the reduced reliability confidence during any single engine powered diversion which may occur during the temporary deviation period, and usage limitations to restrict engine usage to within demonstrated compliant levels.

In the current circumstances EASA has decided that a 120 minute diversion time approval may be granted combined with appropriate mitigation for the lack of a fully demonstrated test requirement.

In addition to the above, mitigation must also be incorporated for any sources of in-flight shutdown, loss of thrust control, or other power loss encountered during the test.

The deviation will be of limited time duration, the demonstration of full compliance must be made before the end of July 2018 at which point ETOPS approval will otherwise be withdrawn.

The Applicant is requested to qualify the reasons why they consider that they have suffered unavoidable unforeseen circumstances and the details of the mitigation actions to be applied.

## **Applicant's Proposal**

Clearance will be provided on the basis of:

1. Completion of 3000 cycles ETOPS test running on all hardware apart from the IP and LP turbine modules and completion of 2600 cycles testing on the IP and LP turbine modules,
2. Boroscope inspection and reporting of results on the hardware at the end of the testing in point 1,
3. Incorporation of mitigation for potential sources of in-flight shutdowns, loss of thrust control, or other power loss encountered during the test and inspections.
4. Mitigation for lack of having fully demonstrated the test requirement as follows:
  - a. Engine usage restricted to 1500 cycles (50% of ETOPS test length)
  - b. IP and LP turbine module usage restricted to 1300 cycles (50% of ETOPS test length)

This is a conservative approach, restricting usage well within the demonstrated levels, and thereby giving confidence in engine reliability, noting that many reliability issues are associated with extended use.

The Applicant understands that any deviation agreed will be temporary and commits to achieving full compliance as soon as possible by demonstration of 3000 cycles on the IP and LP turbine modules.

## **Applicants Safety Equivalency Demonstration**

Subject to Public Consultation EASA is prepared to agree conservative interim ETOPS conditions for failure to fully meet the AMC prescribed test requirements. The conditions will be considered as a temporary deviation. The engine usage restrictions will be recorded in the Airworthiness Limitation Section of the Instruction for Continued Airworthiness. EASA considers the compensating

factors are adequate to substantiate the safety level for the purposes of a Temporary Deviation to CS-E 1040 compliance until such time as full compliance is substantiated.