

Proposed Special Condition on Fuel Quantity Indicating System

Applicable to B787

Introductory note:

The following Special Condition has been classified as an important Special Condition 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

Several accidents have resulted from all engine flame-out due to fuel exhaustion or other in-service incidents have seen flame-out of, at least, one powerplant unit resulting from improper fuel distribution in the aeroplane fuel system causing fuel exhaustion in fuel tank feeding the affected engine.

The causes for the fuel starvation are various:

- increased fuel consumption in combination with incorrect fuel management,
- fuel leaks, not detected in time, or incorrectly managed (management of the fuel imbalance instead of the fuel leak)
- fuel system failures – with improper failure recognition and accommodation,
- incorrect fuel quantity management before departure (upload and distribution).

Contributing factors may include: lack of (independent) fuel low level warning, lack of adequate fuel system warning, or crews lack of confidence in the fuel system warnings.

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The EASA has recognised that in several cases, the triggering of a warning a certain time before fuel exhaustion could have helped the crew to manage the situation, and considering the time required to produce a new rule, a new generic special condition is proposed to be raised under Part 21A.16 (a)(3).

To address the in-service experience described above, the proposed special condition requires a fuel quantity indicating system that provides for adequate fuel system information and alerting to the crew, including a specific low fuel level warning, in order to provide early information to the crew of abnormal situations that may result in engine fuel starvation.

Latest ETOPS rules (FAA and EASA) feature specific requirements for fuel alerts. Those requirements are consistent with the objective described above.

Therefore the proposed Special Condition replaces the current CS 25.1305(a)(2) requirement with the following one :

(a)(2) A fuel quantity indicating system, which:

- (i) displays to the crew the total quantity of usable fuel on board,
- (ii) is capable of indicating to the crew the total quantity of usable fuel in each tank
- (iii) provides a low fuel level warning for any tank and/or collector cell that should not be depleted of fuel in normal operations. This warning must be such that:
 - (1) it is provided to the crew in a timely manner in order to allow continued safe flight and landing,
 - (2) its correct functioning is not affected by any single failure that could cause an erroneous indication of the normal fuel gauging system.
- (iv) provides adequate fuel system information to the crew, including alerts that consider abnormal fuel management or transfer between tanks, and possible fuel leaks in the tanks, the fuel lines and other fuel system components and the engines.