



Initial Airworthiness Special Condition

Passenger Protection from External Fire

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SUBJECT : **Passenger Protection from External Fire**

REQUIREMENTS incl. Amdt. : **CS 25.856(b) at Amendment 22**

ASSOCIATED MOC¹ : **Yes / No**

ADVISORY MATERIAL : **AMC 25.856 / FAA AC 25.856-2A**

INTRODUCTORY NOTE:

The following Special Condition (SC) has been classified as important 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.) 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."

IDENTIFICATION OF ISSUE:

EASA received an application for a major change to type design on a large aeroplane. The design change includes the following features that require a Special Condition to be raised by EASA.

- 1) An integral (structural) rear centre tank (RCT) located behind the wheel bay is introduced to the aeroplane in the lower section of the fuselage, partially replacing the aft cargo compartment.
The RCT creates a 'cold feet' effect for the passengers located above it, and insulation panels will have to be installed between the RCT and the cabin floor for comfort reasons. As per CS 25.856(b), these panels will have to be compliant with the burnthrough specifications. The aircraft manufacturer studied this strategy and concluded that, for the proposed design, compliance with CS 25.856(b) is technically not feasible due to the following reasons:
 - a. It is not possible to install insulation panels between the RCT and the cabin floor that would be compliant with the installation requirements as expressed in FAA AC 25.856 2A, due to the lack of space.
 - b. Burnthrough protection of the cabin floor would leave the decompression panels located on each side of the fuselage unprotected, as they cannot be blocked by any insulation panels. The total area of discontinuities above the RCT in terms of burnthrough protection would be around 10 %.
 - c. Due to the Fire, Explosion and Smoke Risk Assessment (FESRA) conclusions around the RCT, a certain level of ventilation must always be ensured, and any attempt to install burnthrough-compliant material would jeopardize this ventilation.

¹ In case of SC, the associated Interpretative Material and/or Means of Compliance may be published for awareness only and they are not subject to public consultation.

- 2) The integration of a fuselage integral fuel tank located behind the wheel bay, under the passenger cabin, brings additional risks (explosion, penetration by fire, vapor migration, etc) if it is exposed to an external fire. While the other risks are addressed separately, this proposed Special Condition intend to address the risk of penetration by fire only.

Even though paragraph 25.856(b) focuses on the insulation material, the intent of the rule is to provide enough time for the occupants to evacuate the aircraft in case of an external pool fire. An integral fuselage fuel tank exposed to an external fire, if not adequately protected, may not provide enough time for the passengers to safely evacuate the aircraft.


From a fuel tank fire protection perspective, aluminium alloys are indeed recognised to have fire resistant properties, when of a thickness that is appropriate to the function to be performed. This minimum thickness is, unfortunately, not specified. Moreover, from a fuselage burnthrough point of view, it is also acknowledged that an aluminium skin provides very limited protection, hence the fire protection function is mainly provided by the insulation material.

Considering all the above, the following Special Condition is proposed:

Special Condition

Passenger Protection from External Fire

In order to protect the cabin occupants from an external pool fire, the lower half of the fuselage in the longitudinal location of the rear centre tank shall be resistant to fire penetration.

 <p>EASA European Union Aviation Safety Agency</p>	<p>Consultation paper</p> <p>Special Condition</p>	<p>Doc. No. : SC-D25.856-01</p> <p>Issue : 1</p> <p>Date : 18 January 2021</p> <p>Proposed <input type="checkbox"/> Final <input checked="" type="checkbox"/></p> <p>Deadline for comments: 09 FEB 2021</p>
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Means of Compliance to Special Condition SC-D25.856-01

The associated Means of Compliance is published for awareness only and is not subject to public consultation.

In showing compliance to SC-E25.856-01 the following may be considered:

1. The strategy for protection of the fuselage against external pool fire effects for a fuselage structural centre tank installation may be demonstrated to be at least as safe as the previous design of the basic aircraft, for which the burnthrough protection was found compliant with CS 25.856(b).
2. The demonstration can be achieved either through the design features of the RCT itself, or through additional design features.
3. The demonstration can be based on tests, analysis supported by test evidence, or design similarity.
4. When flame penetration testing is performed on materials other than insulation blankets that would be compliant to 25.856(b), the test should be carried out in accordance with the test conditions prescribed in Appendix F Part VII with regards to the fire threat with an exposure time of 5 minutes to the flame. There should be no flame penetration during these 5 minutes.

