

Proposed Special Condition on Post Crash Fire Composite Material

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 02/04 dated 30 March 2004, 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

In the course of large-scale fire tests on aluminium skin fuselage panels, parameters such as skin temperature, temperature behind the insulation materials, cabin temperature, smoke emission, and the quantities of toxic gases produced were assessed along with the time for fire penetration. Results showed that smoke and toxic gas emissions did not need to be separately addressed because they did not become an issue until after penetration of the fire into the cabin.

However, the Boeing Model 787 series aircraft has extensive use of composites in the fuselage, and the conclusions based on the premises of an aluminium structure may not be applicable. Consequently, an assessment of cabin survivability during a post-crash fire is necessary to ensure that no unsafe conditions have been introduced.

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The all-composite fuselage must be examined from a post-crash survivability standpoint because of the possibility that other parameters, such as smoke or toxic gas emissions, could have a significant impact on survivability. Based on service experience and tests, traditional aluminium fuselage materials and insulation systems have not detrimentally affected the survivability within the cabin by emitting any of these toxins.

The consequences of an all composite skin must be also assessed in order to determine its impact on the rescue effort. Surface temperature and structural integrity and combustion gaseous products are among potential concerns. The following Special Conditions have therefore been defined:

1. The applicant must demonstrate that negligible amounts of smoke, toxic gases and released fibres are produced by the composite material during a post crash fire, before the fire penetrates the cabin.

2. It must be shown that no other aspects of post-crash survivability have been compromised, in comparison to a conventional aluminium structure, before the fire penetrates the cabin. For example, where the effects of fire on the composite fuselage could result in delays in the action of rescue crews, or increased danger to them, due to potential weakening of the aircraft during their rescue effort, additional training material should be developed by Boeing for use by airport fire services.