

Proposed Equivalent Safety Finding to CS 25.1443(d): "Minimum mass flow of supplemental oxygen"

Applicable to Boeing 787

Introductory note:

The hereby presented Equivalent Safety Finding has been classified as important 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

Boeing proposes to utilize pulse delivery for the first aid oxygen equipment (PPOS, Portable Pulse Oxygen System) for the Boeing 787. The PPOS delivers a metered pulse of oxygen at the start of each breath.

The delivery of oxygen per CS 25.1443(d) must be at a rate of 4 litres per minute STPD.

With the use of pulse technology, literal adherence to the rule would necessitate delivering a quantity of oxygen to the user that would be several times more than they would use with a conventional system flowing 4 litres per minute STPD.

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Applicant Proposal:

Pulse oxygen delivery provides the compensating design feature that it delivers oxygen only at the start of the inhalation phase of the breathing cycle. Thus, the supplemental oxygen enters the alveoli where transfer to the blood stream takes place. The pulse delivery method does not waste oxygen by filling the transport elements of the lungs, such as the trachea, only to be exhaled or by flowing oxygen during the exhalation cycle.

Applicant Safety Equivalency Demonstration

The delivery of oxygen in the PPOS has to provide a level of safety equivalent to that established by CS 25.1443(d) by showing that it provides the same or better benefit to an individual using first aid oxygen by a comparative test to an existing, compliant constant flow first aid oxygen mask being delivered 4 litres per minute STPD of oxygen.

The proposed test must demonstrate that the PPOS oxygen delivery provides an equivalent physiological effect to a person as indicated by their SaO₂ level when subjected to a hypoxic condition induced by a combination of exercise and reduced partial pressure of oxygen brought about by increased altitude in an altitude chamber.