

Equivalent Safety Finding on CS 25.807(b), CS 25.807(c), CS 25.813[c(2)(i)], and CS25.813[c(4)(i)] at Amdt 15

“Over wing Type III exit interior arrangement”

Applicable to Airbus A321-27xNX/-25xNX models

Issue 1

Introductory note:

The hereby presented Equivalent Safety Finding has been classified as an important Equivalent Safety Finding 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 design of the Airbus A321-27xNX/-25xNX models envisions the installation of two pairs of over wing exits (OWE). The aircraft will be equipped with two pairs of oversized Type III top hinged automatic disposal hatch (ADH) over the wing. Depending on customer configuration either the forward or the rear pair of doors can be de-activated. One exit pair is always required to be active.

Even though the door design has significantly evolved, the relative positioning of the doors to each other and to the wing is identical as on the Airbus A320 model.

The introduction of two pairs of Type III OWE is classified as Major Significant Change and in the frame of this change, the affected requirement according to the Change Product Rule assessment (CPR) is CS 25.807 and CS 25.813 at Amdt 15.

The applicant has requested an Equivalent Safety Finding to allow the installation of passengers' seats adjacent to the OWE (either used as single or as a pair) with reduced clearances with regards to the features of the interior arrangement (seat's cushion encroachment in the vertical plane and offset between the centreline of the exit and the centreline of the passageway in the horizontal plane).

The CS 25.807(b) at Amdt 15 defines the:

“Step down distance. Step down distance, as used in this paragraph, means the actual distance between the bottom of the required opening and a usable foot hold, extending out from the fuselage, that is large enough to be effective without searching by sight or feel.”

and CS 25.807(c) at Amdt 15 defines the:

“Over-sized exits. Openings larger than those specified in this paragraph, whether or not of rectangular shape, may be used if the specified rectangular opening can be inscribed within the opening and the base of the inscribed rectangular opening meets the specified step-up and step-down heights.”

In addition, CS 25.813[c(2)(i)] at Amdt 15 states that:

“Except as provided in subparagraph (c)(2)(ii) of this paragraph, the access must be provided by an unobstructed passageway that is at least 25.4 cm (10 inches) in width for interior

arrangements in which the adjacent seat rows on the exit side of the aisle contain two seats, or 33 cm (13 inches) in width for interior arrangements in which those rows contain three seats. The width of the passageway must be measured with adjacent seats adjusted to their most adverse positions. At least 25.4 cm (10 inches) of the required passageway width must be within the required projected opening width of the exit.”

and CS25.813[c(4)(i)] at Amdt 15 states that:

“For aeroplanes that have a passenger seating configuration of 20 or more, the projected opening of the exit provided may not be obstructed and there must be no interference in opening the exit by seats, berths, or other protrusions (including adjacent seats adjusted to their most adverse positions) for a distance from that exit not less than the width of the narrowest passenger seat installed on the aeroplane.”

Equivalent Safety Finding on CS 25.807(b), CS 25.807(c), CS 25.813[c(2)(i)], and CS25.813[c(4)(i)] at Amdt 15

The equivalence justification below details the means and provisions (i.e. the compensating factors) that the applicant intends to use to demonstrate an equivalent level of safety.

Design / Analysis proposal

- The design features characterizing the over wing Type III exit interior arrangement are:
 - an outward opening ADH Type III exit
 - vertical direction (z-axis)
 - a provided exit opening size of 20”x41” (unobstructed opening) being 5” higher than the minimum requirements (20”x36”)
 - a required opening that can be inscribed within the provided opening in accordance with CS 25.807(c). However, to ensure the minimum required opening is unobstructed in accordance with CS 25.813[c(4)], the base of the inscribed required opening needs to be positioned within the upper part of the actual provided opening respecting the passenger seat cushion immediately adjacent to the exit.
 - an oversized exit (5” higher) to meet the maximum step down allowance of 27” as per the requirements of CS 25.807[a(3)]
 - an outboard seat cushion with compression characteristics in excess of 2” encroachment in the projected **required** opening of the exit up to a maximum of 4”
 - horizontal direction (x-axis) **(applicable only to forward exit of a dual exit configuration)**
 - the relative position of the two Type III exits and the maximum overlap of the required passageway with the clear opening of the forward exit to 6” limits the seat row installation between the exits for the forward exit when both exits are active
 - the required passageway width is only 6” (instead of 10”) within the required projected opening width of the exit. This leads to an offset between the centreline of the exit and the centreline of the passageway of 10,5”

Conditions for the acceptance of the ESF

The following conditions apply to all Type III exit arrangements foreseen.

- The applicant shall demonstrate by test that the door operation is not affected by the interior arrangement, especially by the positioning of the seat relative to the exit's operating handle and by the encroaching seat cushion
- The applicant shall demonstrate by test that the seat cushion of any seat adjacent to the Type III exit(s) is easily compressible when a force of 170 lbs is applied over 40 square-inches (Criteria per guidance provided by AC 25-17A)
- The design and arrangement of all seats bordering and facing an access passageway to a Type III exit, both with and without the bottom cushion in place, must be free from any gap, which might entrap a foot or other part of a person standing or kneeling on the seat or moving on to along the seat row and to resist to evacuees' stepping on the seat.
- The seats shall be compliant to CS 25.562 at Amdt 15 (with the exception of subparagraph [c(5)] and [c(6)]).

The following conditions apply to the forward exit of a dual Type III exit arrangement only.

- The maximum offset of 10,5" between the centreline of the exit and the centreline of the passageway shall not be exceed.
- The applicant shall demonstrate by test that the exit operation and the evacuation related performance (evacuation flow rate) of an interior arrangement with 6" of the required passageway being within the required opening of the exit is at a comparable level to the configuration required by CS25.813[c(2)(i)].

Any single Type III exit or the aft exit of a dual Type III exit arrangement shall comply with the requirements of the CS 25.813[c(2)(i)] at Amdt 15.