Proposed Equivalent Safety Finding on CS25.807(g) at Amdt 13
"Increase of Maximum Passenger Seating Capacity"

Applicable to Airbus A320 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 applicant has requested an increase of the Maximum Passenger Seating Capacity (MPSC) of the A320 aircraft models from the current value of 180, by increasing the credit of seats permitted for the forward and aft floor levels exits.

The A320 has been Type Certified in February 1988, with a MPSC of 179 in accordance with JAR/FAR 25.807(c)(1). The JAA already agreed to increase the MPSC to 180 through Equivalent Safety Finding E-2107 based on data analysis.

In order to achieve a higher MPSC the applicant has requested an Equivalent Safety Finding to increase the credit of seats permitted for the forward and aft floor levels exits to 65 (today the forward and aft floor levels exits are certified as oversized Type I according to E-2107 and equivalent from a performance point of view to Type C).

The change is classified as Major Significant and in the frame of this change, one of the affected requirements according to the Change Product Rule assessment (CPR) is CS 25.807(g) at Amdt 13.

The CS25.807(g) at Amdt 13 requires that:

"Type and number required. The maximum number of passenger seats permitted depends on the type and number of exits installed on each side of the fuselage. Except as further restricted in subparagraphs (g)(1) through (g)(9) of this paragraph, the maximum number of passenger seats permitted for each exit of a specific type installed on each side of the fuselage is as follows:

Type A	*110*
Type B	*75*
Type C	*55*
Type I	*45*
Type II	*40*
Type III	*35*
Type IV	*9*

[…]"

For the A320 models, 55 seats are currently permitted respectively for the forward and aft pairs of oversized Type I floor level exits. Through the Equivalent Safety Finding the applicant intends

to increase the permitted number of passenger seats for each pair of oversized Type I (performing equivalently to a Type C) floor level exits to 65.

The applicant believes that this performance increase is feasible, due to reduced reluctance for escapees to hesitate before using the floor level exit assist means, because:

- the assist means provides
    - a well illuminated sliding surface
    - a sliding surface width exceeding 80" (minimum required per ETSO standard is 20")
    - a beam strength compliant to the values required by ETSO C-69c
- the unobstructed emergency exit dimensions of all emergency exits are not less than 32"x73" (Type C minimum dimensions are 30"x48").

Equivalent Safety Finding on CS25.807(g) at Amdt 13

The equivalence justification below details the means and provisions (i.e. the compensating factors) the applicant intends to use to demonstrate that an equivalent level of safety, compared with the currently required exit performance, will be reached or exceeded for the desired increase in number of seats permitted for the floor level exits.

Design / Analysis proposal

- The design features characterizing the new over-performing Type I exit are:
    - a door size of 32"x73" (unobstructed opening)
    - an escape slide
        - with a usable sliding width of more than 80"
        - capable of staggered use
        - strong enlarged sliding surface boundaries
        - good illumination of the sliding surface
        - beam strength as per the values identified in ETSO C-69c
- For the purpose of demonstrating the individual and overall increased evacuation performance the applicant will conduct:
    - comparative testing on a mock-up, with naïve test subjects, to demonstrate that the evacuation performance of their new over-performing Type I floor level exit sufficiently exceeds the performance of a Type C emergency exit (capable of evacuating 55 passengers). The chosen baseline exit dimensions for this comparative testing have been chosen by the applicant as 30"x60";
    - additional testing and analysis to demonstrate that the requirements of CS25.803(c), including the safety margins described in the associate guidance material, will still be met at aircraft level under the new mandatory configuration for an increased MPSC, through the following means:
        - partial evacuation testing on an operationally representative aircraft configured with the minimum door access path width (20");
        - total cabin evacuation analysis based on the original A320 full scale evacuation demonstration and the newly generated data from this partial evacuation testing with the following assumptions:
            - use of slide-ready times as measured during previous compatibility testing
            - average egress rate as determined in the partial evacuation tests.
    - additional testing and/or analysis to demonstrate that an equivalent level of safety is maintained in foreseeable evacuation scenarios.
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Conditions for the acceptance of the ESF

The applicant should demonstrate the following conditions:

- The applicant should demonstrate through comparative testing with statistically significant results that the non-standard exit configuration provides a proportionate increase in evacuation performance over the Type C performance standard to justify the required increase of maximum number of passenger seats permitted for each of the floor level exit pair (i.e. 65 vs 55), achieved under a conservative approach .
- The applicant should demonstrate through an acceptable number of partial evacuation tests or a full scale evacuation demonstration, under the conditions set in CS25 appendix J, that the new configuration will increase the evacuation performance of the oversized Type I (performing equivalently to a Type C) emergency exits to an extent that the evacuation performance at aircraft level, considering the new desired MPSC, will meet the requirements of CS25.803(c) including the safety margins described in the associated guidance material.
- Should an increase of the dimensions of the emergency exit access area (i.e. passageway, access space, etc.) above the minimum values be needed to demonstrate the desired evacuation performance, such new dimensions will constitute a limitation of the design of the new over-performing Type I emergency exit.
- Should the tests demonstrate an evacuation performance which would lead to a passenger credit above 65, the credit of the new over-performing Type I emergency exit will be in any case limited to 65.
- The maximum passenger seat credit for the remaining emergency exits (i.e. over-wing exits) will be determined by the outcomes of the CPR analysis applicable to the proposed design.
- The other criteria defining a Type C exit remain unchanged and are met (CS25.807(g)(8), 25.810(a)(1)(ii), 25.813(a), 25.813(b)(3) and 25.813(b)(4)).