



Deviation on CS 29.785(a) and CS 29.562(a)

for

Installation of side-facing seats on Helicopters

Introductory note:

The hereby presented Deviation 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.) 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 existing regulations do not provide adequate or appropriate safety standards for occupants of side-facing seats.

CS 29.785(a) requires general occupant protection for occupants of seats that are occupied during take-off and landing and therefore experience the inertia forces specified in 29.562. The intent of 29.562 was to provide an improved level of safety for occupants on large rotorcraft. Because most seating on rotorcraft is forward-facing, the pass/fail criteria developed in 29.562 focused primarily on these seats. With respect to seats other than forward facing, the performance measures of 29.562(c) have proved to adequately address the injury criteria for occupants of aft-facing seats but not for occupants of side-facing seats.

For single occupant side-facing seats, EASA determined that a level of safety that is equivalent to that afforded to occupants of forward and aft-facing seating could be achieved by additional special conditions. However, the best criteria currently available for evaluating multiple occupant side-facing seats do not ensure a level of safety that is equivalent to that afforded to occupants of forward and aft-facing seating.

Therefore EASA can approve the installation of multiple occupant side-facing seats on rotorcraft that include 29.562 in their certification basis, only through a deviation from the general injury requirements of CS 29.785(a) and CS 29.562(a).

EASA Position:

Considering the above discussion, the proposed injury criteria and installation/testing guidelines, representing the minimum acceptable standard to be met in order to be granted a deviation from the general occupant injury criteria of CS 29.785 (a) and CS 29.562(a), are indicated in Appendix A of this Paper.



Appendix A

Deviation

For multiple occupant side-facing seats, the following proposed injury criteria and installation/testing guidelines represent the minimum acceptable standard to be met in order to obtain a deviation from the general occupant injury criteria of CS 29.785(a) and CS 29.562(a). Note that compliance with the structural criteria of CS 29.562(c)(1) and (c)(2) must be demonstrated for side-facing seats using the same conditions for the test and pass/fail criteria as for fore- and aft-facing seats.

1. The proposed injury criteria:

(a) Existing criteria: All injury protection criteria of CS 29.562(c)(3) through (c)(7) apply to the occupants of side facing seating. HIC assessments are only required for head contact with the seat and/or adjacent structures.

(b) Body-to-body contact: Contact between the head, pelvis, or shoulder area of one Anthropomorphic Test Dummy (ATD) with the adjacent seated ATDs is not allowed during the tests conducted in accordance with CS 29.562(b)(1) and (b)(2). If incidental contact of the legs, feet, arms and hands occur during the dynamic event, the test will not necessarily be deemed a failure; however the results will have to be evaluated by the airworthiness authority on a case by case basis. Any contact between adjacent ATDs is allowed during rebound.

(c) Body-to-wall/furnishing contact: If the seat is installed aft of a structure such as an interior wall or furnishing that may contact the pelvis, upper arm, chest, or head of an occupant seated next to the structure, the structure or a conservative representation of the structure and its stiffness must be included in the tests. It is recommended, but not required, that the contact surface of the actual structure be covered with at least two inches of energy absorbing protective padding (foam or equivalent) such as Ensolite.

(d) Thoracic trauma: If the torso of an ATD at the forward most seat place impacts seat and/or adjacent structure during testing, compliance with Thoracic Trauma Index (TTI) injury criterion must be substantiated by dynamic test or by rational analysis based on previous test(s) of a similar seat installation. TTI data must be acquired with a Side Impact Dummy (SID), as defined by 49 CFR Part 572, Subpart F, or an equivalent ATD or a more appropriate ATD and must be processed as defined in Federal Motor Vehicle Safety Standard (FMVSS) Part 571.214, section S6.13.5. TTI must be less than 85, as defined in 49 CFR Part 572, Subpart F. Torso contact during rebound is acceptable and need not be measured.

(e) Pelvis: Lateral pelvic acceleration for all side-facing occupants must be substantiated if there is pelvic contact during testing. Should occupant pelvic contact occur, lateral pelvic acceleration must be substantiated by dynamic test or rational analysis based on previous dynamic testing of a similar design/installation. Pelvic lateral acceleration must not exceed 130g. Pelvic acceleration data must be processed as defined in FMVSS Part 571.214, section S6.13.5.

(f) Occupant Retention: All side-facing seats require end closures or other means to prevent the ATD's pelvis from translating beyond the end of the seat at any time during testing.



2. General Guidelines:

(a) All seat positions need to be occupied for both the longitudinal and the vertical tests.

(b) A minimum of one longitudinal test, conducted in accordance with the conditions specified in CS 29.562(b)(2), is required to assess the injury criteria as follows. Note that if a seat is installed aft of structure (e.g., an interior wall or furnishing) that does not have a homogeneous surface, an additional test(s) may be required to demonstrate that the injury criteria are met for the area which an occupant could contact. For example, different yaw angles could result in different injury considerations and may require separate tests to evaluate.

- For configurations without structure (e.g., wall, bulkhead) installed directly forward of the forward seat place, Hybrid II ATDs or equivalent must be in all seat places.
- For configurations with structure (e.g., wall, bulkhead) installed directly forward of the forward seat place, an SID or equivalent ATD or more appropriate ATD must be in the forward seat place and a Hybrid II ATD or equivalent must be in all other seat places.
- The test may be conducted with or without deformed floor.
- The test must be conducted with either no yaw or 10 degrees yaw for evaluating occupant injury. Deviating away from the no yaw condition must not result in the critical area of contact not being evaluated. Allowing the test to be conducted at 10 degrees yaw will permit many occupant injury tests to be considered the structural test as well. Note that this condition does not provide relief from the requirement that torso restraint straps, where installed, must remain on the occupant's shoulder during the impact condition of § 29.562(b)(2).

(c) For the vertical test, conducted in accordance with the conditions specified in § 29.562(b)(1), Hybrid II ATD(s) or equivalent will be used in all seat positions.

END