Equivalent Level of Safety ELOS-VLA.49-01 for CS-VLA Aeroplanes with stall speed higher than 45 kts

Introductory Note:

The hereby presented Equivalent level of safety has been classified as an important one 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.), 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:

CS-VLA 1 and CS VLA-49b) require that the stalling speed in the landing configuration is not more than 45 knots (83 km/h) CAS (Calibrated airspeed).

Background

The CS-VLA is based on CS-23 small aircraft requirement. It intended to authorise certification of aircraft with a simpler design than the CS-23 and lighter weight. The limit of 45 kts is established so that aeroplanes meeting such criteria would have a lower energy at impact so that they do not need to meet the crashworthiness requirement (as in CS 23 through the CS 23.562).

Safety Equivalency Demonstration

To reach an Equivalent Level Of Safety established by CS-VLA 1 and CS VLA-49b), aeroplanes having a higher stall speed shall have a higher level of protection in case of forced or emergency landing. To do so, they shall meet the dynamic and static crashworthiness requirements established in the CS-23 amdt.4, and they should provide gliding information in case of an engine failure during cruise.

In line with the above the following additional requirements are established:

ELOS-VLA.49-01 is.1
CS-VLA Aeroplanes with stall speed higher than 45 kts

ELOS-VLA.49-01-49 b):

V_{S0} may not exceed 113 km/h (61 knots) (CAS)"

ELOS-VLA.49-01-71:

The maximum horizontal distance travelled in still air, in km per 1000 m (nautical miles per 1 000 ft) of altitude lost in a glide, and the speed necessary to achieve this, must be determined with the engine inoperative and its propeller in the minimum drag position, landing gear and wing flaps in the most favorable available position.

ELOS-VLA.49-01-561 c):

Replace CS-VLA 561c) by:

Each item of mass within the cabin that could injure an occupant if it came loose must be designed for the Ultimate inertia load factors:

i. Upward, 3·0g;
ii. Forward, 18·0g; and
iii. Sideward, 4·5g.

Engine mount and supporting structure are included in the above analysis if they are installed behind and above the seating compartment.

ELOS-VLA.49-01-562:

Compliance to CS 23-562 of Certification Specifications CS-23 amendment 4 shall be shown. The tests must be conducted with an occupant simulated by an anthropomorphic test dummy (ATD), as specified in Appendix J of CS-23 amendment 4. CS 23-562 d) is not applicable.

AMC for ELOS-VLA.49-01-562

FAA Advisory Circular No. 23.562–1 provides additional information and guidance concerning an acceptable means of demonstrating compliance with the requirements of CS 23 regarding dynamic tests of seat/restraint systems. Furthermore, for engines installed behind or above the seating compartment, the engine needs not to be represented during the dynamic seat test as long as it is statically verified as per static emergency load factor, and it can be shown that the engine, as an "item of mass", will not influence dynamically the performance of the seat/dummy/seatbelt attachment.

ELOS-VLA.49-01-785 a)

Replace CS-VLA 785 a) by:

"(Each seat/restraint system and the supporting structure must be designed to support occupants weighing at least 98 kg (215 lb) when subjected to the maximum load factors corresponding to the specified flight and ground load conditions, as defined in the approved operating envelope of the aeroplane. In addition, these loads must be multiplied by a factor of 1·33 in determining the strength of all fittings and the attachment of –

(1) Each seat to the structure; and

(2) Each safety belt and shoulder harness to the seat or structure.

ELOS-VLA.49-01-785 b)

Replace CS-VLA 785 b) by:

"Each seat/restraint system must consist of a seat, safety belt and shoulder harness with a metal-to-metal latching device that are designed to provide the occupant protection provisions required in ELOS-VLA.49-01-562."

ELOS-VLA.49-01-785 e)

Replace CS-VLA 785 e) by:

Each occupant must be protected from serious head injury during an emergency landing by a safety belt and shoulder harness that is designed to prevent the head from contacting any injurious object under the conditions established in ELOS-VLA.49-01-562. AMC VLA 785 (e) is not considered alone as an acceptable means of compliance.

ELOS-VLA.49-01-785 j)

Each restraint system must have a single point release for occupant evacuation

ELOS-VLA.49-01-785 k)

Each seat/restraint system may use design features, such as crushing or separation of certain

components, to reduce occupant loads when showing compliance with the requirements of ELOS-VLA.49-01-562; otherwise, the system must remain intact

ELOS-VLA.49-01-787 e)

Replace CS-VLA 787 e) by:

Aeroplanes that provide for baggage to be carried in the same compartment as passengers must have a means to protect the occupants from injury when the baggage or cargo is subjected to the inertia loads resulting from the ultimate static load factors of ELOS-VLA.49-01-561 c), assuming the maximum allowed baggage or cargo weight for the compartment."

ELOS-VLA.49-01-967 e)

Add the following text at the end of the existing CS-VLA 967 (e):

In showing compliance with subparagraph CS-VLA 967 (e) (2), the tearing away of an engine mount must be considered unless all the engines are installed above the wing or on the tail or fuselage of the aeroplane.

ELOS-VLA.49-01-1411 b)

Replace CS-VLA 1411 b.2) by

"Protect the safety equipment from damage caused by being subjected to the inertia loads specified in ELOS-VLA.49-01-561 c)"

ELOS-VLA.49-01-1585 g)

In addition to CS-VLA 1585 the procedures, speeds and configuration(s) for a glide following engine failure in accordance with ELOS-VLA.49-01-71 and the subsequent forced landing, must be furnished.