Proposed Special Condition on Airworthiness Standards for CS-VLA Aeroplanes with Maximum Take Off Mass more than 750 kg

Introductory Note:

The hereby presented Special condition has been classified as an important Special Condition 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:

The applicability of CS-VLA is limited to aeroplanes with maximum take-off mass (MTOM) of not more than 750 Kg. In accordance with 21A.16B, this Special Condition establishes additional requirements for aeroplanes with MTOM up to 850 Kg.

Justification:

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 MTOM of 750 Kg and the limit of 45 kts of stall speed in landing configuration are 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).

If one of the two limits is exceeded, considerations upon crashworthiness have to be done. In case both limits are exceed, CS-23 shall be considered rather than CS-VLA.

The present special condition aims to provide additional requirements in order to extend the MTOM limit up to 850 Kg, but keeping the stall speed within the 45 kts (CAS).

With respect to the stall speed, which is the main contributor to the crashworthiness characteristics, the weight has a lower impact and therefore, in lieu of applying the whole CS 23.562, a lighter approach to crashworthiness has been considered.

Special condition:

Considering all the above, the following Special condition is proposed:

SPECIAL CONDITION SC-CVLA-div01

CS-VLA Aeroplanes with MTOM of 850 Kg

SC-CVLA.01

In addition to CS-VLA.1 the following applies:
The Maximum Certificated Take Off Mass can be extended to 850 Kg.

SC-CVLA.02 (see AMC SC-CVLA.02)

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 favourable available position.

SC-CVLA.03 (see AMC SC-CVLA.03 (b) and (c))

In addition to CS-VLA.561, the following applies:

(a) Each seat is to be equipped with at least a 4-point harness system;

(b) The applicant shall evaluate the head strike path with validated methods, and minimise the risk of injury in case of a head contact with the aircraft structure or interior.

(c) The design shall provide reasonable precautions to minimize the lumbar compression loads experienced by occupants in survivable crash landings;

(d) Each seat/harness system shall be statically tested to an ultimate inertia load factor of 18g forward, considering an occupant's mass of 77 Kg. The lapbelt should react 60 percent of this load, and the upper torso restraint should react 40 percent of this load.

(e) In place of CS-VLA 561 (c) the following applies:
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 included in the above analysis if they are installed behind and above the seating compartment.

SC-CVLA.04

In addition to CS-VLA 1587 (a) the following applies:
(6) the glide performance determined under SC-CVLA.02

AMC to SC-CVLA–div01

AMC-SC-CVLA.02

Background. The primary purpose of this information is to provide the pilot with the aeroplane gliding performance. Such data will be used as an approximate guide to the gliding range that can be achieved, but will not be used to the same degree of accuracy or commercial significance as many other aspects of performance information. Hence some reasonable approximation in its derivation is acceptable.

Means of compliance
(1) Engine-Inoperative
Tests. Clearly the simplest way of obtaining accurate data is to perform actual engine-inoperative glides. These tests should be carried out over an airfield, thereby permitting a safe landing to be made in the event of the engine not restarting at the end of the test.
(i) Fixed Pitch Propeller. Most likely, the propeller will be windmilling after the fuel is shutoff. If this is the case and the propeller does not stop after slowing to the best glide speed, then the gliding performance should be based on a windmilling propeller. Stalling the aeroplane to stop the propeller from windmilling is not an acceptable method of determining performance because the procedure could cause the average pilot to divert attention away from the primary flight task of gliding to a safe landing.
(ii) Constant-speed / Variable-pitch propeller aeroplanes. For these propellers, the applicant may assume that the means to change propeller pitch is still operational and therefore the propeller should be set at the minimum drag configuration. For most installations this will be coarse pitch or feather.
(2) Sawtooth Glides. If Sawtooth Glides are used to determine the glide performance, these glides can be flown using the same basic procedures in paragraph 23.65 of the guidance material in CS 23 Book 2. For simplification, the test need only be flown at an intermediate altitude and gross weight generating one speed for the pilot to use. The best lift over drag speed is frequently higher than the best rate of climb speed; therefore, the airspeed range to flight test may be bracketed around a speed 10 to 15% higher than the best rate of climb speed.
(3) Performance Data. A chart or table should be constructed for the AFM that presents the literal (over-the-ground) gliding distances for the altitude range expected in service, at the demonstrated glide speed. As a minimum, a statement of NMs per 305 m (1 000 ft) loss of altitude at the demonstrated configuration and speed at MTOW, standard day, no wind, has to be given.

AMC-SC-CVLA.03 (b)

The following method is accepted as means of compliance to the subject paragraph (ref. *FAA AC No. 23-11B)*:

(1) The head strike path can be conservatively determined from actual test data, specifically, “Airplane Crash Survival Design Guide, Volume 1 – Design Criteria and Checklists,” report number USAAVSCOM TR 89-D-22A.
(2) The applicant should overlay the flail envelope from figure 43 of this document with the cockpit of the airplane.
(3) The overlay of the head strike path with the cockpit shows that a head strike will not occur.

AMC-SC-CVLA.03 (c)

An energy absorbing device (e.g. seat cushion made of energy absorbing foam, honeycomb, etc.) proven to minimize injuries and lumbar loads can be accepted as means of compliance to the subject paragraph.