

## **Proposed Equivalent Level of Safety on “Short- and Soft Field Take-off Procedure”**

### **Introductory Note:**

The hereby presented Equivalent Level of Safety has been classified as an important Equivalent Level of Safety 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:**

JAR/CS 23.207(d) requires that the stall warning must not occur during the normal take off when operated in accordance to the procedures required in JAR/CS 23.1585 (d)(1) with the speeds required in JAR/CS 23.51(a)(b).

The requirement for a take-off without the stall warning occurring was introduced in 1993 with FAR 23 Amendment 45. The vast majority of single engine, light aircraft was certified prior to that amendment, and later changes to these aircraft did not incorporate the amended stall warning paragraph. As such, many single engine aeroplanes already have their rotation speed defined without considering the stall warning.

Although JAR / CS 23.51 allows the take-off speed to be low as  $1,1 v_{S1}$ , the selection of the take-off speeds is often driven by the stall warning requirement (JAR/CS 23.207(d)) which requires that the stall warning must not occur during take-off and approach to landing. In order to satisfy this requirement, the rotation speeds are normally set well above the minimum speed allowed by JAR/CS 23.51. In addition, the selected rotation speed for some aeroplanes is also well above the speed where the aeroplane exhibits a natural tendency to lift off, forcing the aeroplane to be actively held to the ground until the proper rotation speed is reached, resulting in an increased ground roll and a pronounced rotation to reach the proper climb speed at 50ft.

The requirement for a stall warning not happening during take-off was introduced to address the issue of nuisance warnings, i.e. habituation to an unnecessary or ineffective warning, which could lead to a habitual disregard to the stall warning prior to an actual, unintentional stall.

For a normal take-off procedure, this approach represents an increase of overall safety.

Under certain conditions where it is imperative to lift-off from the ground as soon as practical - take-off from a soft field, or a short run-way surface - a reduced rotation speed could be necessary and there could be the chance that the rotation speed does not meet the JAR/CS 23.307(d) requirement.

The aim of this ELOS is to guarantee that when the requirement 23.307(d) is not met, other measures are in place so that the safety level is not decreased. The ELOS is aimed to increase the awareness of the pilot during this specific alternative “short/soft field take-off procedure” where rotation happens at lower speed – closer to the stall speed - and a different take-off procedure is being employed.

**Justification:**

1. The establishment of short- and soft field take-off procedures is not new; it is common on light single engine aeroplanes.
2. The service experience on many a/c type identified that a reduction of the rotation speed would lead to a significant reduction of the take-off roll and more natural lift-off behaviour, enhancing safety on the operation from grass airfields.
3. The take-off speeds as required in JAR/CS 23.51 are fully complied with.
4. The other subparagraph of JAR/CS 23.207 are complied with

**Safety Equivalency Demonstration:**

Considering all the above, the following ELOS is proposed:

1. The pilot is adequately alerted of the fact that he is using an alternative take-off procedure, where a reduced airspeed margin to a stall is used, and attention must be paid. As part of the procedure, it shall be well explained to the pilot the consequences of the different behaviour of the stall warning in this alternative take-off procedure;
2. No stall warning must occur during the stabilized climb phase;
3. The selected new rotation speed shall be in full compliance with JAR/CS 23.51 except for the stall warning. This has to be proven by actual flight tests and must be furnished in the AFM;
4. The operating procedure and performance information for the short- and soft-field take-off must be furnished in addition to JAR/CS 23.1585;
5. Safe aborted take-off behaviour in case of engine failure has to be demonstrated, and must be part of the AFM emergency procedures;
6. The suitability of this T/O procedure under all reasonably expected conditions, including turbulence shall either be demonstrated, or restricted to the conditions that were demonstrated to be safe to use.