



Federal Aviation Administration

Memorandum

Date: DEC 13 2007

From: Manager, Project Support Branch, ACE-112

To: Manager, Small Airplane Directorate, ACE-100

Prepared by: Greg Davison, Aerospace Engineer, ACE-112

Subject: Review and Concurrence, Equivalent Level of Safety to JAR 22.51, Amendment 4, "Take-off," for the DG Flugzeugbau DG-808C Powered Glider, ACE-07-08

This memorandum documents concurrence for the subject finding of an Equivalent Level of Safety (ELOS). We request your office to review and concur with the proposed ELOS finding to Joint Airworthiness Regulations (JAR) 22.51, Amendment 4, "Take-off." The proposed ELOS will allow for the compliance to the regulation to be accomplished using a reduction in the required take-off speed.

Background:

The DG Flugzeugbau DG-808C is a self-launching, single-place, motorglider with a retractable engine and fixed pitch propeller. Its Solo engine provides take-off power of 53 hp at 6300 RPM. It is available with two different wingspans (15m and 18m) and two different versions (Classic and Competition). Maximum weight for the Classic version is 1157 lbs; for the Competition version, maximum weight is 1323 lbs. Both versions are certificated by European Aviation Safety Agency (EASA) to operate in the Utility category.

Applicable Regulation:

The applicable regulation is JAR 22.51, Amendment 4, which states:

"For a powered sailplane the take-off distance at maximum weight and in zero wind, from rest to attaining a height of 49.2 ft (15 meters) at a speed not less than $1.3V_{S1}$, must be determined and must not exceed 1640.4 feet (500 meters) when taking off from a dry, level, hard surface and 1968.5 feet (600 meters) when taking off from a dry, level, grass surface."

Basis for Equivalent Level of Safety:

DG Flugzeugbau's Position:

The reason for an Equivalent Level of Safety to JAR 22.51, Amendment 4, is the selected take-off speed does not comply with the $1.3V_{S1}$ regulatory requirement. The selected take-off speed for the DG 808C is 90 km/h (48.6 knots). Per JAR 22.51, Amendment 4, the minimum speed is $1.3V_{S1}$, which for the 15 meter and 18 meter version is 82 km/h (44.3 knots) (stall speed in take-off configuration) $\times 1.3 = 106.6$ km/h (57.6 knots) (airbrakes retracted). For airbrakes extended, the minimum speed of $1.3V_{S1}$ is 90 km/h (48.6 knots) (stall speed in take-off configuration) $\times 1.3 = 117$ km/h (63.2 knots).

According to Notice of Proposed Amendment (NPA) 22B-53 (issued in October 1992), which was incorporated into JAR 22.51, Amendment 5, the speed of $1.3V_{S1}$ may not be appropriate for the take-off of "real" powered sailplanes, because this value might be too far from the best climb speed, particularly when a fixed-pitch propeller is used. JAR 22.51, Amendment 5 states an option that the selected speed must not be less than $1.15V_{S1}$ and that this speed must be shown to be safe under all reasonably expected operating conditions, including turbulence and complete engine failure. Using this criterion, the minimum speed for the DG-808C 15 and 18 meter versions with airbrakes retracted is 94.3 km/h (50.9 knots). The minimum speed for the 15 and 18 meter versions with the airbrakes extended is 103.5 km/h (55.9 knots). The selected speed of 90 km/h (48.6 knots) falls below the allowance of Amendment 5.

However, due to the climb with the lower speed of 90 km/h (48.6 knots), the DG-808C climb rate is significantly better than using a climb rate of $1.3V_{S1}$ or $1.15V_{S1}$ and the aircraft clears the ground more quickly. Climbing at $1.3V_{S1}$ would result in much higher engine RPM, thereby reducing the thrust and increasing the noise level. Trials have shown that the climb speed of $V_y = 90$ km/h (48.6 knots) is safe under all operating conditions. Complete engine failure was demonstrated by switching off the ignition and braking the propeller.

Therefore, the selected take-off speed of the DG-808C meets the requirements of JAR 22.51 such that the distance to attain a height of 15 meters (49.2 feet) is less than the limit of 500 meters (1640.4 feet) when taking off from a dry, level hard surface and less than 600 meters (1968.5 feet) when taking off from a dry, level, grass surface.

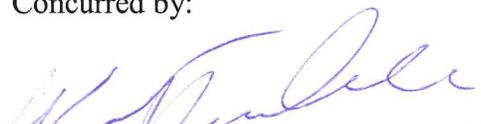
Luftfahrt-Bundesamt's (LBA) Position:

The LBA concurs with the findings of DG Flugzeugbau for an equivalent level of safety, identified by DG Flugzeugbau Substantiation Report No. 8/18/22.51-1-6, dated July 28, 1993, which establishes an alternative to the minimum take-off speed set forth by JAR 22.51, Amendment 4. The LBA agrees with this FAA ELOS. It carries the same intention as the LBA ELOS applied during type certification of the aircraft in Europe.

FAA's Position:

We concur with the findings of the LBA that the DG Flugzeugbau DG-808C meets the take-off requirements of JAR 22.51, Amendment 4, and an Equivalent Level of Safety to this regulation is established as required per 14 CFR, part 21, § 21.21(b)(1).

Concurred by:



Manager, Project Support Branch, ACE-112

12/11/07
Date



Manager, Standards Office, ACE-110

12-13-07
Date

for



Manager, Small Airplane Directorate, ACE-100

12/13/07
Date

for