



Federal Aviation Administration

Memorandum

Date: September 27, 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 22.207(c),
Amendment 4, "Stall Warning" for the DG Flugzeugbau DG- Powered Glider,
ACE-07-07

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 JAR 22.207(c), Amendment 4, "Stall Warning." The proposed ELOS will allow for the compliance to the regulation to be accomplished via aerodynamic buffeting.

Background:

The DG Flugzeugbau DG-808C is a self-launching, single-place, motorglider with a retractable engine and fixed pitch propeller. Wing fuel bags and winglets are optional. It is available with two different wingspans (15m and 18m) and two different versions (Classic and Competition). Both versions are certificated by European Aviation Safety Agency (EASA) to operate in the Utility category.

Applicable Regulation:

The applicable regulation is JAR 22.207(c), Amendment 4, which states:

22.207(c): The stall warning must begin at a speed between $1.05 V_{S1}$ and $1.10 V_{S1}$ and must continue until the stall occurs.

Basis for Equivalent Level of Safety:

DG Flugzeugbau's Position:

As for most modern sailplanes, the DG-808C does not fulfill the original JAR 22.207(c) requirement. The stall warning does not begin at a speed between $1.05 V_{S1}$ and $1.1 V_{S1}$, but rather at a speed between $1.03 V_{S1}$ and $1.06 V_{S1}$ depending on the wing flap setting (measured with a DLR static probe). During the stall, the airspeed indicator first shows lower, then higher speeds. The behavior applies to clean wings. With light rain, the stall warning begins at higher speeds between $1.05 V_{S1}$ and $1.1 V_{S1}$.

When the stall warning (by aerodynamic buffeting) starts, the angle of attack must be increased to stall the DG-808C. This is clearly visible by the pilot. Due to the characteristics of the wing section, there will be little reduction in airspeed as the lift coefficient is only slightly increased after buffeting initiates.

After increasing the pitch attitude while at aft and medium C.G. positions, wing dropping occurs. This condition occurs earlier at positive flap settings. With negative flap settings, nearly full stick back is necessary to start the wing to drop. If the stick is released as soon a wing dropping starts, bank angles of only 10 to 20 degrees will occur.

Therefore, the stall behavior of the DG-808C is safer than with a wing section which has a rapid loss of lift after reaching its maximum lift coefficient, even if the DG-808C has an earlier stall warning. This is due to the pilot not looking on the airspeed indicator, but observing the glider pitching angle.

Additional stall conditions are as noted:

Stall warning with the powerplant extended:

1. With the engine running at full power, the rolling motion can be controlled during the stall. No uncontrollable wing dropping occurs. The natural buffeting of the DG-808C during stall is noticeable.
2. With the engine running at idle, the stall characteristics are similar to the condition of the engine retracted. The engine vibrations overlay the natural buffeting of the sailplane during stall, but the natural buffeting can still be noticed.
3. With the engine stopped, stall characteristics are similar to engine retracted configuration. The buffeting due to the vortexes of the powerplant overlays the natural buffeting of the sailplane during stall. The natural buffeting can hardly be noticed.

LBA's Position:

The LBA concurs with the findings of DG Flugzeugbau for an equivalent level which establishes an alternative to the initiation of the stall warning set forth by JAR 22.207(c), Amendment 4.

FAA's Position:

We concur with the findings of the LBA that DG Flugzeugbau has established an equivalent level of safety to JAR 22.207(c) Amendment 4, for the DG-808C motorglider.

Concurred by:

William J. Timberlake
 Manager, Project Support Branch, ACE-112

9/20/07
 Date

Patrick R. Mullen for
 Manager, Standards Office, ACE-110

9/27/07
 Date

Sandra J. Campbell for
 Manager, Small Airplane Directorate, ACE-100

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 Date