



Federal Aviation Administration

Memorandum

Date: April 2, 2012

To: Manager, Small Airplane Directorate, ACE-100

From: Manager, Project Support Branch, ACE-112

Prepared by: Jim Rutherford, Aerospace Engineer, Project Support, ACE-112

Subject: Extension of Equivalent Level of Safety (ELOS) Finding to JAR 22.207(c),
Amendment 6, for DG Flugzeugbau's Model DG-1000M, FAA Project #
AT00394CE-G

ELOS Memo#: ACE-07-01A

Regulatory Ref: JAR 22.207(c)

This memorandum requests your office to review and provide concurrence with the proposed extension of an existing Equivalent Level of Safety (ELOS) finding, ACE-07-01, for the stall warning regulation of Joint Airworthiness Requirements (JAR) 22.207(c) to the DG Flugzeugbau model DG-1000M glider.

Background:

The DG-1000M is a derivative model glider to be included on type certificate (TC) G20CE, along with the prior certificated model DG-1000T. The model DG-1000M is a two-seat, self-launching, mid-wing, powered glider with retractable engine and fixed pitch propeller certified in the utility category and used for training and cross-country flying. The stall warning characteristics for the derivative model DG-1000M are fundamentally identical to those for the model DG-1000T specified in the original ELOS.

The following information provides the background and justification for the original approval of ELOS ACE-07-01 to the model DG-1000T:

The DG Flugzeugbau DG-1000T is a self-sustaining, two-place, high performance motorglider with a retractable powerplant suitable for basic and aerobatic training and cross-country flying. It is available with two different wingspans: 18m and 20m. Water ballast in the wings and fin are optional with the 18m span and standard with the 20m span. A ballast box is installed in the

tail fin and can be used to compensate for the weight of the rear pilot and to aid in trim for heavy pilots.

Applicable regulation:

The applicable regulation is JAR 22.207(c), Amendment 6, which states:

22.207(c): The stall warning must begin at a speed between 1.05 V_{SI} and 1.1 V_{SI} and must continue until the stall occurs.

Regulation requiring an ELOS finding:

JAR 22.207(c)

Description of Compensating Design Features:

The German civil airworthiness authority, Luftfahrt Bundesamt (LBA), has approved an equivalent level of safety for the DG Flugzeugbau DG-1000T stall warning requirement of JAR 22.207(c), Amendment 6. This equivalent level of safety, based on the EASA's Notice of Proposed Amendment (NPA) 22B-73, establishes an alternative to the initiation of the stall warning set forth by JAR 22.207(c). NPA 22B-73 for 22.207(c) states:

“The stall warning shall begin:

- 1) At a speed between 1.05 V_{SI} and 1.1 V_{SI} or;*
- 2) Between 2 and 5 seconds before the stall occurs when longitudinal control is moved at a pace corresponding to 2 km/h (1.08 knots, 1.24 mph) per second rate of reduction of speed and shall continue until the stall occurs”.*

This NPA was incorporated in the first issue of European Aviation Safety Agency (EASA) Certification Specifications for Sailplanes and Powered Sailplanes (CS 22).

Explanation of Compensating Design Features:

As for most modern sailplanes, the DG-1000T does not fulfill the original JAR 22.207(c) requirement. The stall warning does not begin at a speed between 1.05 V_{SI} and 1.1 V_{SI} , but rather at a speed of 1.04 V_{SI} and is demonstrated through aerodynamic buffeting, which starts between 2 and 3 seconds before the stall occurs, when the longitudinal control is moved at a pace corresponding to the 2 km/h (1.08 knots, 1.24 mph), per second rate of speed reduction. This buffeting continues until the stall occurs.

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-1000T 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.*

DG Flugzeugbau position is that the model DG-1000M also complies with the revised stall warning requirements found in Section 22.207(c)(2) of the EASA NPA 22B-73. EASA has approved an Equivalent Safety Finding for the model DG-1000M stall warning requirement of JAR 22.207(c), Amendment 6. DG Flugzeugbau has therefore requested this ELOS be granted by the Federal Aviation Administration.

After reviewing the submitted data and analysis, the FAA concurs with the DG Flugzeugbau and EASA positions on this issue.

Based on the similarity of the stall warning characteristics of the respective models, the FAA concurs with the requested extension of the model DG-1000T ELOS to the model DG-1000M for the stall warning regulation of JAR 22.207(c).

FAA Approval of the ELOS Finding:

The Small Airplane Directorate concurs with the extension of ELOS ACE-07-01 for the DG Flugzeugbau model DG-1000T sailplane to the model DG-1000M. The DG Flugzeugbau model DG-1000M is granted ELOS number ACE-07-01A.

John Colomy

Manager, Small Airplane Directorate,
Aircraft Certification Service

4-2-12

Date

ELOS Originated by: Small Airplane Directorate	Manager, Project Support Branch: William J. Timberlake	Routing Symbol: ACE-112
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