



**NOTICE OF PROPOSED AMENDMENT (NPA) No 2008-11**

**DRAFT DECISION OF THE EXECUTIVE DIRECTOR OF THE EUROPEAN AVIATION  
SAFETY AGENCY**

**AMENDING**

**DECISION NO. 2003/13/RM OF THE EXECUTIVE DIRECTOR OF THE EUROPEAN  
AVIATION SAFETY AGENCY**

**of 14 November 2003 on**

**Certification specifications including airworthiness codes and acceptable means of  
compliance for sailplanes and powered sailplanes (« CS-22 »)  
and**

**DECISION NO. 2003/18/RM OF THE EXECUTIVE DIRECTOR OF THE EUROPEAN  
AVIATION SAFETY AGENCY**

**of 14 November 2003 on**

**Certification specifications including airworthiness codes and acceptable means of  
compliance for very light aeroplanes (« CS-VLA »)**

***"Exits"***

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## A. EXPLANATORY NOTE

### I. General

1. The purpose of this Notice of Proposed Amendment (NPA) is to envisage amending Decision 2003/13/RM of the Executive Director of 14 November 2003<sup>1</sup> and to envisage amending Decision 2003/18/RM of the Executive Director of 14 November 2003<sup>2</sup>. The scope of this rulemaking activity is outlined in ToR VLA.004 and is described in more detail below.
2. The Agency is directly involved in the rule-shaping process. It assists the Commission in its executive tasks by preparing draft regulations, and amendments thereof, for the implementation of the Basic Regulation<sup>3</sup> which are adopted as "Opinions" (Article 19(1)). It also adopts Certification Specifications, including Airworthiness Codes and Acceptable Means of Compliance and Guidance Material to be used in the certification process (Article 19(2)).
3. When developing rules, the Agency is bound to following a structured process as required by Article 52 of the Basic Regulation. Such process has been adopted by the Agency's Management Board and is referred to as "The Rulemaking Procedure"<sup>4</sup>.
4. This rulemaking activity is included in the Agency's rulemaking programme for 2008. It implements the rulemaking task VLA.004.
5. The text of this NPA has been developed by the Agency, following the development of a Regulatory Impact Assessment (RIA) by a dedicated Rulemaking group. It is submitted for consultation of all interested parties in accordance with Article 52 of the Basic Regulation and Articles 5(3) and 6 of the Rulemaking Procedure.

### II. Consultation

6. To achieve optimal consultation, the Agency is publishing the draft decision of the Executive Director on its internet site. Comments should be provided within 3 months in accordance with Article 6(4) of the Rulemaking Procedure. Comments on this proposal should be submitted by one of the following methods:

**CRT:** Send your comments using the Comment-Response Tool (CRT) available at <http://hub.easa.europa.eu/crt/>

**E-mail:** Only in case the use of CRT is prevented by technical problems these should be reported to the [CRT webmaster](#) and comments sent by email to [NPA@easa.europa.eu](mailto:NPA@easa.europa.eu).

**Correspondence:** If you do not have access to internet or e-mail you can send your comment by mail to:

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<sup>1</sup> Decision No 2003/13/RM of the Executive Director of the European Aviation Safety Agency of 14.11.2003 on certification specifications, including airworthiness codes and acceptable means of compliance for sailplanes and powered sailplanes ("CS-22").

<sup>2</sup> Decision No 2003/18/RM of the Executive Director of the European Aviation Safety Agency of 14 November 2003 on certification specifications, including airworthiness codes and acceptable means of compliance for very light aeroplanes (« CS-VLA »)

<sup>3</sup> Regulation (EC) No 216/2008 of the European Parliament and of the Council of 20 February 2008 on common rules in the field of civil aviation and establishing a European Aviation Safety Agency, and repealing Council Directive 91/670/EEC, Regulation (EC) No 1592/2002 and Directive 2004/36/EC (OJ L 79, 19/03/2008, p. 1)

<sup>4</sup> Management Board decision concerning the procedure to be applied by the Agency for the issuing of opinions, certification specifications and guidance material ("Rulemaking Procedure"), EASA MB 08-2007, 13.6.2007

Process Support  
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Germany

Comments should be received by the Agency before 16 August 2008. If received after this deadline they might not be taken into account.

### III. Comment response document

7. All comments received in time will be responded to and incorporated in a comment response document (CRD). The CRD will be available on the Agency's website and in the Comment-Response Tool (CRT).

### IV. Content of the draft decision

8. Background

The Agency has received 2 safety recommendations<sup>5</sup> issued by the Air Accident Investigation Branch (AAIB) of the UK Department of Transport following unrelated accidents to UK registered aeroplanes. In both cases, non-fatal accidents occurred where the aeroplanes came to rest in an inverted position with the occupants unable to escape unaided due to the design of the canopy, which opened upwards.

Both recommendations are similar in content and state the following:

#### ***Safety Recommendation 2004-107***

*The European Aviation Safety Agency (EASA) should review the requirements for the design of exits and the provision of safety equipment within the Certification Specifications for Very Light Aeroplanes (CS-VLA), to enable rapid escape from such aircraft in any normal or crash attitude including turnover.*

In response to the recommendations, the Agency initiated rulemaking task VLA.004 "Exits" and a rulemaking group was formed to assess the case for amending the certification specifications to improve escape possibilities from a turnover position. The Terms of Reference for the group was not limited to CS-VLA but included other categories of small aeroplanes (CS-23 and CS-22), where this issue could be equally applicable. This NPA is developed by the Agency based on the outcome of this activity.

9. Statistical Analysis

A detailed analysis of accident data has not been possible for this task as no European wide accident reporting system covering the applicable category of aeroplanes is currently mandated. EC Directive 2003/42/EC on occurrence reporting<sup>6</sup> is applicable only to turbine-powered or public transport aircraft. Furthermore, there is no reliable data regarding the number of flights and flight hours made by registered aircraft.

Some states and foreign authorities maintain an occurrence reporting system that is voluntary for small aircraft. Data from these reporting systems has been obtained and some similar events have been identified (See table below). However, this data can not

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<sup>5</sup> AAIB Safety Recommendation Number 2004-107 (10 July 2004).  
[http://www.aaib.dft.gov.uk/cms\\_resources/G-BXDO\\_3-05.pdf](http://www.aaib.dft.gov.uk/cms_resources/G-BXDO_3-05.pdf)

AAIB Safety Recommendation Number 2003-70 (11 August 2002).  
[http://www.aaib.dft.gov.uk/cms\\_resources/dft\\_avsafety\\_pdf\\_023439.pdf](http://www.aaib.dft.gov.uk/cms_resources/dft_avsafety_pdf_023439.pdf)

<sup>6</sup> Directive 2003/42/EC of the European Parliament and of the Council of 13 June 2003 on occurrence reporting in civil aviation

be considered as an exhaustive list, but is provided here only as examples to illustrate the type of events that can occur.

No	Aircraft	Date	Occupant Escape details	Applicable A/c Data	Reference
1	Fournier RF5B G-BAPA	26/09/1997	Fatal Accident Aeroplane crashed inverted and burst into flames.	MTOW 680kg  Single main & tail wheel u/c	AAIB Bulletin July 1998.
2	Cozy G-BXDO	10/07/2004	<i>"The aircraft was quickly righted by several people who were at the scene and the pilot then exited normally from the relatively undamaged cockpit, once the canopy, which opens upwards on a forward hinge, was free to open."</i>	MTOW 680kg  Tricycle u/c	AAIB Bulletin March 2005.
3	Tri-R Kis G-BXJI	11/08/2002	<i>"Although uninjured [the occupants] were unable to get out of the aircraft because the gull wing doors were held shut by the weight of the aircraft. The pilot used a hand held fire extinguisher to break the perspex windscreen and, in doing so, activated the extinguisher filling the cockpit with extinguishant. At that point two people arrived from the control tower and righted the aircraft. The two occupants were then able to exit normally through the doors. There was no fire and they suffered no ill effects from the contents of the fire extinguisher."</i>	MTOW 635kg  Tricycle u/c	AAIB Bulletin June 2001.
4	Robin DR400-500 HB-KFE	23/09/2006	Fatal Accident. Indications are that the single occupant survived the crash but was subsequently unable to escape from the inverted position, despite aid from other people at the scene. Aircraft caught fire.	MTOW 1060kg  Tricycle u/c	Büros für Flugunfalluntersuchungen (BFU)
5	Globe Swift N80715	12/02/2006	<i>"Pilot and passenger exited after kicking out the canopy"</i>	MTWA 890kg  Tailwheel	NTSB LAX06LA112
6	Harmel RV6A Homebuilt N221MH	15/10/2005	<i>"The pilot and passenger exited the airplane after airport rescue personnel broke the canopy"</i>	MTOW 730kg  Tricycle u/c	NTSB LAX06CA019
7	Pitts Special N55MW	22/02/2006	<i>"...exit from the airplane was aided by a cracked canopy... He manually broke a hole through the canopy and exited the airplane"</i>	MTOW 770kg  Tailwheel	NTSB CHI06LA085

Table 1: Examples of accidents involving turnover of small aeroplane where the safety of those on board was severely compromised due to their inability to rapidly escape.

The data set includes one fatal accident (Ref: Table 1 No.1), where the upturned aeroplane subsequently caught fire. However, it remains uncertain from the accident report as to whether the single occupant could have survived had egress been possible.

The Agency is also aware of a similar accident in Switzerland (Ref: Table 1 No.4). Although the BFU investigation is still ongoing, initial indications are that the accident aeroplane experienced an engine problem in-flight that resulted in a forced landing, with the aeroplane coming to rest in an inverted position. The single occupant survived the impact, but was subsequently unable to escape, even with the assistance of members of the public who attended the scene. The aeroplane subsequently caught fire resulting in the death of the occupant.

## 10. Review of Existing Requirements

A review of the existing EASA Certification Specifications has identified the following design requirements applicable to different categories of aeroplanes.

### a) CS-23

CS 23.807 Emergency exits states the following:

#### **CS 23.807 Emergency exits**

*(a) Number and location. Emergency exits must be located to allow escape without crowding in any probable crash attitude. ...*

AMC to CS 23.807 makes direct reference to FAA AC 23-17. The current version, AC 23-17B dated 12 April 2005<sup>7</sup>, provides the following guidance on this issue:

#### **23.807 Emergency exits**

...

*Emergency exits should allow escape without crowding in any probable crash attitude. The inverted position is considered probable for both tail wheel and tricycle gear airplanes. This applies to airplanes with doors, forward sliding canopies, rearward sliding canopies and jettisonable canopies. If escape in an inverted attitude is not obvious or is questionable, then compliance should be shown.*

*It is not acceptable for certification purposes, except for acrobatic airplanes (§ 23.807(b)(5)), to rely on an emergency procedure requiring canopy jettisoning before an accident occurs. ...*

The AC material makes clear reference to the inverted position and furthermore identifies this condition as a probable event, irrespective of the landing gear configuration.

The Agency believes that CS 23.807 together with the related AMC provides a sufficient minimum standard to address emergency egress from an inverted position for this category of aeroplane.

### b) CS-VLA

CS-VLA 783 Exits, states the following:

#### **CS-VLA 783 Exits**

*(a) The aeroplane must be so designed that unimpeded and rapid escape is possible in any normal and crash attitude excluding turnover.*

*(b) ...*

No AMC is provided.

JAR-VLA (subsequently CS-VLA) was originally developed to create a simple and inexpensive class of small aeroplanes to offer an alternative to microlights that had no common European airworthiness standards. The turnover attitude was specifically excluded from JAR-VLA 783, Exits. When JAR-VLA 783(a) was originally developed (published 26 April 1990), it was considered that a requirement coming from JAR 22.807(a) would be more appropriate than FAR 23.783(a). Crash attitudes were taken into account, except the turnover position, as including turnover was thought to preclude the use of canopies. For turnovers it was considered that the canopy must be opened prior to the crash.

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<sup>7</sup> The relevant text of AC 23-17B 23.807 remains unchanged from AC 27-17 dated 25 April 2000

The Agency, in reviewing the original justification for excluding turnover in JAR-VLA, believes that an operational procedure that requires the canopy to be opened prior to a crash is neither realistic nor practicable in many cases (e.g. forward hinged canopy). AC 23-17 states that the inverted position should be considered probable for both tail wheel and tricycle gear aeroplanes for compliance with CS-23/FAR Part 23. Furthermore, an examination of occurrence records as part of this task, although limited in scope and depth of analysis due to the unavailability of data, does show that it is not uncommon for small aircraft, including those in the VLA category, to turn over during a crash. The Agency therefore sees no justification why this should not be equally applicable to aeroplanes in the VLA category. This NPA proposes that the certification specification is amended so that turnover is not excluded from CS-VLA when considering post crash escape provisions.

The use of canopies is common in VLA certificated aeroplanes. Typically they are made of materials such as: Plexiglas, acrylic, polycarbonate, etc. One of the specific characteristics of such materials is their lack of frangibility. Tests have shown that often it is necessary to "puncture" a canopy before the panel will yield. Blunt application of force aimed at breaking the canopy may not be sufficient. Although the current regulations do not require the installation of a crash axe or similar tool in light aircraft, some national aviation authorities are now issuing recommendations to operators to voluntarily consider the installation of such equipment. In considering the inverted position, the use of such equipment would be an acceptable means of compliance if it was demonstrated that rapid escape was then possible.

In reviewing CS-VLA, the Agency has also concluded that the text of CS-VLA 783(a) is misplaced and proposes to move it to CS-VLA 807, with appropriate changes. This will provide consistency throughout the CSs.

c) CS-22

CS 22.807 Emergency exits, states the following:

**CS 22.807 Emergency exit**

*(a) The cockpit must be so designed that unimpeded and rapid escape in emergency situations during flight and on the ground is possible with the occupant wearing a parachute.*

*(b) ...*

No AMC is provided.

At present, CS-22 has a general requirement that the cockpit must be so designed to allow rapid and unimpeded escape. The turnover condition is not specifically excluded by the rule and is therefore interpreted as being already required.

Current certification practice recognises differences between configurations of sailplanes/powered sailplanes and that some types may be more susceptible to turnover than others. Most conventional sailplanes with a close coupled single main undercarriage are deemed not to be susceptible to turnover and the lack of occurrence reports identified as part of the statistical analysis tends to confirm this conjecture. Furthermore, without an engine and fuel system fitted, there is no additional fire hazard. For other types, particularly "touring motor gliders", which are fitted with an engine and may have tricycle or main/tail wheel undercarriage configurations similar to CS-VLA types, the risk of turnover may be more pronounced and escape from a turnover position may be considered during certification.

The Agency believes that the current rule, which provides an objective requirement covering all aircraft in this category, remains appropriate. However, further guidance is given in a new AMC in order to provide clear acceptable means of compliance. This takes the form of a three part assessment as follows:

1. Assess susceptibility to turnover and the likelihood of additional post-crash hazards (e.g. fire).
2. If it is determined that a design is not susceptible to turnover no further action is necessary. If however turnover remains a distinct possibility or is questionable and additional hazards may be present, provision should be made in the basic design to allow the occupants to rapidly escape from an inverted position.
3. As an alternative to provisions within the basic design, it is acceptable to install equipment (e.g. crash axe) that would permit the occupant(s) to make a rapid escape from the inverted position. In this case, it would not be necessary to consider the wearing of a parachute, as escape could be made more rapidly if the occupants released their parachutes prior to egress rather than attempt to enlarge an escape opening or risk getting entangled.

**The envisaged change to Decision 2003/13/RM (CS-22) is:**

In Book 1 SUBPART D - Design & Construction, introduce a reference to new AMC 22.807(a). Add a new AMC 22.807(a) to give guidance on assessing configurations susceptible to turnover and, where appropriate, that the turnover condition is properly addressed to provide the ability for persons onboard to escape an inverted aircraft.

**The envisaged change to Decision 2003/18/RM (CS-VLA) is:**

In Book 1 SUBPART D - Design & Construction, amend CS VLA.783 Exits and CS VLA.807 Emergency exits. The change will delete the exclusion of turnover as a design consideration in order to enable persons onboard to escape an inverted aeroplane. Additional Acceptable Means of Compliance (AMC) is provided in Book 2.

## **V. Regulatory Impact Assessment**

### **11. Purpose and intended effect**

#### **a. Issue which the NPA is intended to address**

Accident investigations and occurrence reports associated with small aircraft have highlighted a potential safety issue regarding emergency egress from an aircraft in an inverted position. The issue is particularly relevant in the case of aircraft equipped with gull wing doors or a sliding canopy, where the weight of the upturned aircraft on the exit prevents it from opening. In combination with additional post-crash hazards such as fire, this situation could severely jeopardise the safety and survivability of occupants.

The objective of this NPA is to propose a change to the design standards applied to small aeroplanes (CS-VLA and CS-22), in the light of recent accidents and incidents involving escape from an aircraft in an inverted position.

#### **b. Scale of the issue (quantified if possible)**

The number of VLA and small aeroplanes in the EC that can be considered to be vulnerable to the addressed risk are estimated at several thousands.

Due to the limited data available, it has only been possible to identify a small number of actual accidents and incidents where small aeroplanes ended in a turnover attitude and where the occupants had difficulty exiting or required assistance.

#### **c. Brief statement of the objectives of the NPA**

The objective is to improve the escape possibilities from a turnover attitude for small aircraft for which this risk exists.



## 12. Options

The identified options are:

Option 1: Do nothing

Option 2: Change Certification Specifications to ensure the design of future small aeroplanes take due consideration of the inverted position.

Option 3: As Option 2 but also include retroactive application to improve the safety of the current fleet.

## 13. Sectors concerned

Designers of small aircraft (CS-VLA, CS-22) and organisations involved in major modifications to those aircraft.

Individual owners/operators of small aircraft.

## 14. Impacts

### a. All identified impacts

#### i. Safety

Option 1: Would have no effect on safety. Accidents and incidents involving turnover would continue to occur, jeopardising the safety of those onboard.

Option 2: Changes to CS-VLA will ensure that new designs will incorporate a higher minimum standard that addresses occupant escape, including the turnover condition. Due to the low number of new General Aviation designs being type certificated and the low exchange rate of aircraft (i.e. new designs replacing older ones), a change in the CSs will have little immediate safety benefit.

The change to CS-22 will have no safety benefit but is intended to provide clarification to the existing certification specification and certification practice.

Option 3: The same as Option 2 plus retroactive application aimed at enhancing safety levels on the existing fleet would ensure existing types met the intent of the new design standard. A quantified assessment of the safety benefit has not been possible due to the lack of occurrence data on which to perform a detailed analysis. Two fatal accidents where the aircraft attained an inverted position following a crash have been identified. However, the occupants' inability to escape has not been positively identified as a causal factor in either occurrence.

#### ii. Economic

Option 1: May have a negative economic impact if fatal accidents continue to occur and it can be established that the inability to escape from a turnover attitude is a direct causal factor.

Option 2: The introduction of amended certification specifications and/or AMC would only apply to new designs or major modifications. The economic impact would therefore be minimal in relation to the overall design and certification cost.

Option 3: Retroactive action that required modification to the basic design would have a large economic burden on operators/owners.

Installation of emergency escape equipment into the existing fleet is considered as economically acceptable.

iii. Environmental

No environmental impact has been identified.

iv. Social

No social impact has been identified.

v. Other aviation requirements outside EASA scope

FAA: Sailplanes and VLA are addressed as a special class in accordance with FAR 21.17(b). The appropriate airworthiness standard is specified by the administrator and can refer to CS-22 / CS-VLA, if appropriate.

b. Equity and fairness in terms of distribution of positive and negative impacts among concerned sectors.

No equity and fairness issues have been identified.

15. Summary and Final Assessment

a. Comparison of the positive and negative impacts for each option evaluated:

Option 1: No effects on safety. May have a negative economic impact if fatal accidents continue to occur and it can be established that the inability to escape from a turnover attitude is a direct causal factor.

Option 2: There will be a positive effect on safety for CS-VLA with moderately negative economical consequences. The proposed change to CS-VLA will provide a clear requirement that turnover must be considered in future designs and will be consistent with the other CSs.

For CS-22, no change in standard is proposed, but clarification is given in new AMC 22.807 to ensure the turnover condition is properly considered in sailplane design.

Option 3: The case for retroactive action of design changes is considered to be unsubstantiated. A qualitative assessment indicates that the economic impact of design changes far outweigh the likely safety benefits. Retroactive installation of emergency escape equipment within the cockpit may be more economically feasible. However, without a clear safety benefit having been established and the possible additional hazard that such equipment could bring, the Agency will not mandate the retroactive installation of crash equipment. It is recognised that some NAAs are recommending the voluntary installation of crash axes and the Agency supports such an approach.

b. A summary of who would be affected by these impacts and issues of equity and fairness:

The proposals would equally affect manufacturers and customers / operators.

c. Final assessment and recommendation of a preferred option:

After due consideration the Agency decided that Option 2 is to be preferred. This will ensure that the minimum standard defined in CS-VLA is enhanced to include turnover and improve egress from an upturned aeroplane. CS-22 is amended by the addition of AMC to provide greater clarification for compliance with CS 22.807.

**B. DRAFT DECISION**

The text of the amendment is arranged to show deleted text, new text or new paragraph as shown below:

- deleted text is shown with a strike through: ~~deleted~~
- new text is highlighted with grey shading: **new**
- ....

indicates that remaining text is unchanged in front of or following the reflected amendment.

**I. Draft Decision to CS-22***Article 1*

Decision 2003/13/RM of the Executive Director of the Agency of 14 November 2003 is hereby amended as follows:

**Book 1****SUBPART B Design & Construction****CS 22.807 Emergency exit**

(a) The cockpit must be so designed that unimpeded and rapid escape in emergency situations during flight and on the ground is possible with the occupant wearing a parachute. (See AMC 22.807(a))

(b) ...

**Book 2****AMC 22.807(a) Emergency Exit**

When assessing ground escape, the possibility of the aircraft coming to rest in an inverted (turnover) position should be determined together with an evaluation of post-crash hazards that could endanger the occupants in such an attitude (e.g. the risk of fire).

If it is determined that a design is not susceptible to turnover or the evaluation determines that there is unlikely to be any life threatening post-crash hazard that demands rapid occupant egress, then no further action is necessary. If however turnover remains a distinct possibility or is questionable and potentially life threatening post-crash hazards may exist, provisions should be made in the basic design to allow the occupants to make a rapid escape from a turnover position.

As an alternative to provisions within the basic design, it is acceptable to install equipment (e.g. crash axe) that would permit the occupant(s) to make a rapid escape from the inverted position. In such a case, it would not be necessary to consider the wearing of a parachute, as escape could be made more rapid if the occupant(s) released their parachute(s) prior to egress rather than attempt to enlarge an escape opening or risk getting entangled.

A canopy could be accepted as compliant with the turnover provision, if qualified escape equipment (e.g. a crash axe) or specific design features (e.g. identified weak point) on the canopy are provided.

**II. Draft Decision to CS-VLA***Article 2*

Decision 2003/18/RM of the Executive Director of the Agency of 14 November 2003 is hereby amended as follows:

**Book 1****SUBPART D – Design & Construction****CS-VLA 783 Exits**

- ~~(a) The aeroplane must be so designed that unimpeded and rapid escape is possible in any normal and crash attitude excluding turnover.~~
- ~~(b) No exit may be located with respect to any propeller disc so as to endanger persons using that exit.~~

**CS-VLA 807 Emergency exits**

- (a) The aeroplane must be so designed that unimpeded and rapid escape is possible in any normal and crash attitude. (See AMC VLA 807(a))
- (b) ~~Where exits are provided to achieve compliance with CS VLA 783 (a),~~ The opening system must be designed for simple and easy operation. It must function rapidly and be designed so that it can be operated by each occupant strapped in his seat, and also from outside the cockpit. Reasonable provisions must be provided to prevent jamming by fuselage deformation.

**Book 2****AMC VLA 807(a) Emergency exits**

Unless otherwise justified, the inverted position (turnover) should be considered probable. If escape in an inverted position is not obvious or is questionable, then compliance should be demonstrated.

A canopy could be accepted as compliant with the turnover provision, if qualified escape equipment (e.g. a crash axe) or specific design features (e.g. identified weak point) on the canopy are provided.