COMMENT RESPONSE DOCUMENT (CRD) TO NOTICE OF PROPOSED AMENDMENT (NPA) 2008-08

for amending the Executive Director Decision No. 2003/14/RM of 14 November 2003 on certification specifications, including airworthiness codes and acceptable means of compliance, for normal, utility, aerobatic and commuter aeroplanes (« CS-23 »)

"Stall speed greater than 113 km/h (61 knots)"

Explanatory Note

I. General

1. The purpose of the Notice of Proposed Amendment (NPA) 2008-08, dated 30 April 2008 was to propose an amendment to Decision N° 2003/14/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 normal, utility, aerobatic and commuter category aeroplanes (« CS-23 »).

II. Consultation

2. The draft Executive Director Decision amending Decision N° 2003/14/RM was published on the web site (http://www.easa.europa.eu) on 30 April 2008.

   By the closing date of 30 July 2008, the European Aviation Safety Agency ("the Agency") had received 16 comments from 12 National Aviation Authorities, professional organisations and private companies.

III. Publication of the CRD

3. All comments received have been acknowledged and incorporated into this Comment Response Document (CRD) with the responses of the Agency.

4. In responding to comments, a standard terminology has been applied to attest the Agency's acceptance of the comment. This terminology is as follows:

   - **Accepted** – The comment is agreed by the Agency and any proposed amendment is wholly transferred to the revised text.
   - **Partially Accepted** – Either the comment is only agreed in part by the Agency, or the comment is agreed by the Agency but any proposed amendment is partially transferred to the revised text.
   - **Noted** – The comment is acknowledged by the Agency but no change to the existing text is considered necessary.
   - **Not Accepted** - The comment or proposed amendment is not shared by the Agency

   The resulting text highlights the changes as compared to the current rule.

5. The Executive Director Decision will be issued at least two months after the publication of this CRD to allow for any possible reactions of stakeholders regarding possible misunderstandings of the comments received and answers provided.

6. Such reactions should be received by the Agency not later than **22 November 2008** and should be submitted using the Comment-Response Tool at http://hub.easa.europa.eu/crt.

IV. CRD table of comments, responses and resulting text

(General Comments)	-

comment	*1* comment by: *FAA* The FAA has reviewed NPA No. 2008-08 and has no comments.
response	*Noted*

comment	*4* comment by: *Pilatus* Pilatus as a single engine aircraft manufacturer is delighted to see that EASA addressed the concerns raised against NPA 10/2006 and is now proposing full harmonisation with the US FAR 23 regulation. From a manufacturer's point of view the harmonisation is appreciated as it will reduce cost and additional work to negotiate and issue Special Conditions if the maximum stall speed was exceeded and/or to show compliance with the "old" non-harmonised regulations. Pilatus furthermore believes that the change will lead to a better product for the public as it will not have a negative impact on occupant safety and may well enhance the safety. Survivability of a forced landing isn't dependent upon stalling speed but on the energy absorption capability of the aircraft structure. Modern aircraft designs and present analytical tools result in a much higher degree of crashworthy aircraft structures which can increase the probability of survivability during an uncontrolled emergency forced landing. With an equivalent safety approach, that is based on the higher kinetic energy during an impact with a stall speed exceeding the 61 kts, the same level of safety achieved by the previously stall speed limitation can therefore be provided. Pilatus welcomes and fully supports the proposed harmonisation with the US FAR 23 regulation.
response	*Noted*

comment	*5* comment by: *Austro Control GmbH* This NPA is supported Austro Control.
response	*Noted*

comment	*8* comment by: *Royal Danish Aeroclub* The Royal Danish Aeroclub support the suggested idea of simplifying and harmonizing with existing FAR-23 for the Certification Standard CS23.

	From the Danish organization, we have no other comments to the proposed NPA-2008-08.
response	*Noted*

comment	*9* comment by: *Luftfahrt-Bundesamt* Although the LBA is supporting the possibility of increasing the stall speed it is highly recommended to set an upper limitation. Neither the physical conditions and consequences nor the influence of other parts and intention of CS 23 justify also stall speeds of 100 knots for example. The limitation should be somewhere between 65 and 75 kts depending on the results of recommended further investigations.
response	*Not accepted* There is currently no data available to justify a stall speed limit as suggested by the commentator. Future rulemaking tasks will address the technical developments in the area of CS-23 aeroplanes and their impact on the requirements. The objective of this NPA is however to harmonise the current stall speed and related emergency landing requirements for a stall speed above 113 km/h (61 knots) with FAR 23. This harmonisation is currently already applied through special conditions.

comment	*11* comment by: *CAA-NL* caa-nl supports this NPA
response	*Noted*

comment	*12* comment by: *UK CAA* The proposal to harmonise with FAR 23, with its unlimited stall speed provisions, is not supported. It was argued in NPRM 91-12 that retaining the limit would require future designs to incorporate "larger and more complex high-lift systems" which "may result in a reduction in the low speed flying qualities and lessen the level of safety...". This is inadequate justification. Compliance with the 61 knot stall speed requirement should not be beyond the capabilities of today's designers. In addition, higher wing loadings are the choice of the applicant, and all aeroplanes, regardless of the complexity of their high-lift systems, have to meet the same handling certification criteria. Justification Self explanatory
response	*Noted*

The justification as referred to from NPRM 91-12 is not part of the justification for this NPA. Designers' capabilities have not been used as an argument in the justification for this rulemaking proposal.

As stated in both the comment and the NPA, the handling certification criteria are unchanged.

A. Explanatory Note - I. General p. 3

comment *7* comment by: *Light Aircraft Association UK*

The LAA notes the content of this NPA and has no comment at this time.

response *Noted*

A. Explanatory Note - IV. Content of the draft opinion/decision p. 4-5

comment *2* comment by: *Walter Gessky*

The subject as proposed is supported by the Austrian Ministry of Transport, Innovation and Technology

response *Noted*

comment *13* comment by: *UK CAA*

The NPA states that there is no evidence in the NTSB Accident Database to support the concern that increased stall speeds will lead to increased risk to occupants and third parties of unsafe forced landings (because of the increased forced landing distance required and consequential reduction in the number of suitable forced landing sites).

It is suggested that the US experience is not relevant to European countries where the population densities and topography are far less conducive to this alleviation than the US, where it originated.

Justification
Inadequate safety case provided in the NPA.

response *Noted*

The risk for occupants of the aeroplane or to third parties on the ground in case of an unsafe forced landing is very much dependent on the circumstances, and different cases can therefore not be easily compared. Dependent on how, where and when such a situation occurs, the US accidents may not always be representative for the European environment. It is however assumed that within the same environment, in this case the US, a review can be made to identify if injury or fatality rates of aeroplanes with a stall speed above 61 knots shows any significant difference with aeroplanes that have a stall speed below 61 knots. No such striking differences have been found, which was mentioned in the NPA.

comment	*15* comment by: *UK CAA* IV. Content of the draft decision, paragraph 11 The proposed applicability of this alleviation to some twin engined aeroplanes is not supported. NPRM 91-12 stated that the proposals resulted from petitions from manufacturers of single-engined turboprop aeroplanes so that they could "obtain the full performance and economic advantages of incorporating the latest turbine-powered design technology in single-engine airplanes, and provide a higher cruise speed with lower specific fuel consumption". It would appear therefore that there is no demand for this provision to be extended to twin-engined aeroplanes. It is suggested that the future interests of aviation safety, and the obligations placed on the Agency by EC Regulation 216/2008, would be better served by discouraging the production of twin engined aeroplanes which cannot demonstrate compliance with the existing climb gradient of CS 23.67(a)(1), rather than allowing them further alleviation in this way. Justification Inadequate safety case made for the proposals.
response	*Noted* The safety case for the aeroplane occupants is related to a forced landing at a higher speed because of the proposed increased maximum stall speed. In case of an engine failure, a forced landing is considered equally probable for a single engine aeroplane and a twin-engine aeroplane that does not meet the climb performance criteria of CS 23.67(a)(1). Therefore both configurations are considered applicable. There is no justification provided that would support a disharmonisation with the current FAR 23 with respect to the mentioned twin-engined aeroplanes.

A. Explanatory Note - V. Regulatory Impact Assessment p. 5-6

comment	*6* comment by: *Diamond Aircraft Ind.* DAI completely supports a full harmonization with the current Federal Aviation Regulation (FAR23) for the stall speed requirements of single-engine aeroplanes, and multi-engine aeroplanes of 2722kg (6000 lb) or less maximum weight. This harmonization between FAR 23 and CS 23 is beneficial for the global aviation industry, where authorities are converging on rulemaking to achieve common requirements worldwide.
response	*Noted*

comment	*14* comment by: *UK CAA* V. Regulatory Impact Assessment - paragraph 16 Impacts - Safety The safety case only concerns the occupants of the aeroplane. The increased risk to third parties on the ground, as described in the previous comment, has not been addressed. Justification Self-explanatory.

response *Noted*

The safety risk to third parties on the ground is addressed in the mentioned paragraph. The available accident data from aeroplanes that already are certified with higher stall speed do not show controlled, forced landings that result in a higher risk for people on the ground.

The increased kinetic energy related to the higher stall speed is not considered to increase the risk for third parties as in general aviation the impact to non-involved third parties is already known to be statistically insignificant[1].

B. DRAFT DECISION p. 7

comment *3* comment by: *G.C. Valdonio, AOPA Italia*

The origin of the 61 kts stall speed limitation for single engined aircraft dates back to the US CAR3 regulations, which specified this limit as 70 mph. It was just a "common sense" qualitative limit, defining an arbitrary number to reduce the effects of a crash landing, not based on any rational motivation. This number has since become gospel and has remained unchanged in the subsequent FAR23, JAR23 and nos CS23, but its arbitrary nature is still evident.
This limitation has the unfortunate effect to limit the wing loading in the neighborhood of 100 kg/m2, and therefore to influence the design of the aircraft tying it to a wing dimension which might be excessive. It is our belief that a high speed touring aircraft should go to a wing loading of 130-140 kg/m2 to obtain a better speed and a reduced turbulence/gust response, but this would entail a stalling speed above the regulatory limit. Even worse is the situation for the forthcoming single personal jets, which should go to an even higher wing loading to have acceptable performance and gust response characteristics.

Furthermore, we remind you that the original CAR3/FAR23 limitation did not imply any crashworthiness resistance, and that many aircraft are still built and sold today in conformity to old TC (for example, all the Cessna and Piper singles), which do not provide any substantiated crashworthiness resistance.

Finally, the recent development of reliable BRP (Ballistic Release Parachutes) has demonstrated the possibility of safe crash landings, without imposing any limit to the aircraft stalling speed.

We are therefore proposing the following:

- Whenever a BRP (Ballistic Released Parachute) is installed, the stalling speed is absolutely unlimited by the norm.

- Whenever the crashworthiness tests required by CS.23 (as it is today) are carried out, stalling speed can be increased to 70 kts.

- If the stalling speed can be demonstrated to be below 61 kts, no crashworthiness tests are required.

- Since the above rules may result in take-off and landing performance and

[1] Refer to attachment A and E of NPA 14-2006 available at http://www.easa.europa.eu/ws_prod/r/doc/NPA/final A-NPA 14-2006 General Aviation (15.08.06).pdf

handling more demanding than those of the presently used lightplanes, the Flight Manual should mandatorily indicate the accelerate/stop distance for any aircraft with a stalling speed above 61 kts.

- The imposition of an increased limit load, as required in the proposed changes to CS.23.562(d)(1), is totally irrelevant to crashworthiness, and does not imply any greater level of safety. The rationale for this request is not understood and this requirement should be deleted.

response *Not accepted*

The objective of this rulemaking task is to harmonise the maximum stall speed requirements consistent with the FAR Part 23. The emergency landings requirements are changed to compensate for this increased maximum stall speed but do not address a full review of crashworthiness requirements, nor the introduction of ballistic recovery parachute. This change will allow higher stall speeds and therefore for new concepts, like mentioned in the comment.

There is currently no substantiation for a research or rulemaking task on crashworthiness of CS-23 aeroplanes.

Take-off and landing performance parameters are required in the Flight Manual by CS-23 Book 2 Flight Test Guide paragraph 6 section 3.

The increase of the load factors of CS 23.561(b) by applying the new CS 23.562(d)(1) is enhancing the structural requirements that provides protection against serious injuries. This is introduced to maintain the level of safety.

B. DRAFT DECISION - SUBPART C STRUCTURE p. 8

comment *10* comment by: *Luftfahrt-Bundesamt*

LBA comment referring to CS 23.562 (d)(1):
It is not understandable to have this requirement placed in CS23.562. More reasonable would be a new § CS23.561(d) referencing not only the factors in CS23.561(b) but also CS23.561(c), as the basis for the required analysis is the stall speed.
What is the reason to limit the resulting load factor with respect to V_{S0} of 146 km/h (79 kts) if it is accepted to have higher stall speeds?
The existing CS23.561(d) and (e) have to be shifted.

LBA comment referring to CS 23562 (d)(2):
Why is CS23.562(b)(1) addressed only? The situation simulated in CS23.562(b)(2) is influenced much more by a higher stall speed.

response *Noted*

All specific requirements for single-engined aircraft with a stall speed of more than 113 km/h at maximum weight, and twin-engined aircraft of 2722 kg (6000 lb) or less maximum weight that do not meet CS 23.67(a)(1) are kept within one paragraph, harmonised with the current FAR requirements.

The requirement CS 23.561(c) is related to a wheels-up landing at moderate descent velocity. An increased stall speed does not mean that this moderate descent rate needs to be increased.

The factor used to calculate the resulting load factor is limited to a stall speed

of 146 km/h since this results in a loading of 32 g in CS 23.562(b)(1). This g level is approaching the upper bounds of g levels encountered in survivable accidents investigated by the NTSB and represents a substantial increase over that afforded to aircraft with a 61 kt stall speed. Refer also to the NTSB safety report *"GENERAL AVIATION CRASHWORTHINESS PROJECT: PHASE III - ACCELERATION LOADS AND VELOCITY CHANGES OF SURVIVABLE GENERAL AVIATION ACCIDENTS, NTSB/SR-85/02".*

The LBA comment concerning the influence on CS 23.562(b)(2) is understood, however the relative level of safety provided by the two test elements of the existing CS 23.562 requirement and the relationship with stall speed are not so clearly linked.

In the pre-amble to the Final Rule docket introducing FAR 23 amendment 44 the FAA stated that

> *"The results of the study conducted by the Small Aircraft Stall Speed Study Group, which consisted of the analysis of 37,530 accident reports over a 6-year period, failed to show a clear correlation between occupant survivability and landing stall speed."*

The NTSB report NTSB/SR-85/02 concluded that seat restraint systems designed to the GASP design criteria (as currently found in CS 23.562(b)(2)) would still offer substantial protection in accidents where the loads were greater than those of the criteria. Conversely the same report recognises the compromise made due to lack of space below seats in small aircraft that resulted in the GASP proposal for dynamic seat loads in the vertical direction being somewhat lower relative to the limits of survivability. The GASP proposal for downward dynamic seat testing was adopted via the earlier FAR and JAR 23 into the existing CS 23.562(b)(1).

The majority of marginally survivable accidents including substantial vertical deceleration resulted in crippling back injuries, whereas in survivable accidents involving principally longitudinal deceleration, such levels of permanently de-habilitating injury could largely be avoided through the use of properly adjusted and tested shoulder harnesses, which is required in CS 23.785.

On this basis the Agency believes that harmonising with the later FAA requirement that increases the loads in the downward dynamic test condition, provides an appropriate level of safety addressing the proven areas of concern.

comment	*16* comment by: *DGAC France* the formula of tr .96 should be replaced by 0.96
response	*Accepted*

resulting text

CS 23.562 Emergency landing dynamic conditions
(SEE AMC 23.562)

….

(d)

For all single-engined aeroplanes with a V_{SO} of more than 113 km/h (61 knots) at maximum weight, and those twin-engined aeroplanes of 2722 kg (6 000 lbs) or less maximum weight with a V_{SO} of more than 113 hm/h (61 knots) at maximum weight that do not comply with CS 23.67(a)(1);

(1) The ultimate load factors of CS 23.561(b) must be increased by multiplying the load factors by the square of the ratio of the increased stall speed to 113 km/h (61 knots). The increased ultimate load factors need not exceed the values reached at a V_{SO} of 146 km/h (79 knots). The upward ultimate load factor for aerobatic category aeroplanes need not exceed 5·0g.

(2) The seat/restraint system test required by sub-paragraph (b)(1) of this paragraph must be conducted in accordance with the following criteria:

(i) The change in velocity may not be less than 9·4 m (31 feet) per second.

(ii)(A) The peak deceleration (g_p) of 19g and 15g must be increased and multiplied by the square of the ratio of the increased stall speed to 113 km/h (61 knots):

$g_p = 19{\cdot}0\ (V_{SO}/113)^2$ or $g_p = 15{\cdot}0\ (V_{SO}/113)^2$

(B) The peak deceleration need not exceed the value reached at a V_{SO} of 146 km/h (79 knots).

(iii) The peak deceleration must occur in not more time than time (t_r) which must be computed as follows:

$$t_r = \frac{31}{32{\cdot}2\ (g_p)} = \frac{0{\cdot}96}{g_p}$$

Where g_p = the peak deceleration calculated in accordance with paragraph (d)(2)(ii) of this section and t_r = the rise time (in seconds) to the peak deceleration.