European Aviation Safety Agency

Comment Response Document (CRD)
on Consultation paper nr. 17 of 26 August 2003

CS-VLR
Certification Specifications for Very Light Rotorcraft

Foreword to the Comment Response document (CRD)

To give a rapid overview of the CRD, the following keywords were used in responding to comments:

- "Carried": The proposed amendment is wholly transferred to the revised text.

- "Noted": The comment is acknowledged and where needed the text has been improved.

- "Deferred": The comment requires further assessment by the Agency under its future rulemaking programme.

- "Disagreed": The comment is not shared by the Agency.

CRD - CS - VLR Book 1-2

General Comments

Para.

55 / Magni Gyro, Italy

Comment

we've exomined the regulotion ond droft obout new provisions for Aeronoutics ond Airworthiness ond we ore now toking the liberty to submit our comments to your ottention; we ore now writing you becouse we hove interests in a sector ot present included omong those offected by soid new regulotions.

Magni Gyro is an Italian company \"'orking in gyroplanes' production sector since more than 15 years. Our products are worldwide distributed, in Europe they are usually ranked in the ULM (Powered Ultra Light) category .Already more than 200 of our gyroplanes are operated in 3 continents and we have an enviable safety record, no accident has ever been reported because of structural failures or instability.

We feel those new community regulations to be of a great importance for safety, being safety, since ever, a very important aspect for us.

Trying to identify the adequate category for our gyroplanes, we've seen that for Regulation EC n° 1592/2002, as written in the EnglisII version in the Official Journal L240, 07/09/2002 P. 0001 -0021, rotorcrafts are totally excluded from UL category and are totally considered in what we can define as ex-JAR category (rif. ANNEX II-Aircraft referred to in Article 4 (2)).

First of ali we have to specify that the matter seems to be quite confused; the Italian version (as published on the "Gazzetta Ufficiale delle Comunità Europee) is different: while in (e} the English version uses the word aeroplanes, the Italian one uses the word aircrafts.

A rotorcraft is an aircraft but we can't calI it aeroplane.
We would like a clarification on this point.

Anyway if the English version has to be considered the correct one (being, we believe, an originai and not a translation), we will have to face a generai and total "shake" /revolution of our sector with related charges expectably very important and increased (e.g. factory, production, procedures and maintenances certifications and related lost of an important share of the market)
To make this situation even worst, always referring to the draft we've examined, we've seen that the new regulation far rotorcrafts comes directly from helicopter regulation: it stiII consider aII helicopter peculiarity without considering neither gyroplanes' peculiarity nor aII other rotorcraft ones.
Let's talk about what we do know better: gyroplanes have a rotar as helicopters but the pitch (blades pitch) is a fix one, furthermore the rotar is not engine-driven so there are no transmissions, no tail rotar, no swash plate, no rotating controls nor collective contrai.
We can't really see how to consider gyroplanes as helicopters versus regulations.
The gyroplane is now 80 years old, it is even older than the helicopter but it is stili simpler being without aII above-mentioned components.
We can easily say that it is half way between an aeroplane and an helicopter.
The engine is not linked to the rotor and it works as it does for aeroplanes.
Gyroplanes have tails and rudders as aeroplan~s.
Rotor blades have, as already stated, a fix pitch and their own aerodynamic profile has been designed for auto-rotation that is gyroplanes' permanent flight condition.
I have more than 10 years of experience in helicopters having worked for Augusta-BeII and Italian Silvercraft as specialist and pilot, I truly hope that there will soon be adequate requirements for aII type of rotorcraft and so I hope that a regulation adequate to gyroplanes will be issued too.
Evaluating time required to comply with new regulations I would like to suggest to give the chance of keeping UL category for gyroplanes with MTOW within 450 Kg. {two-seaters) or 300 Kg. {single seater) as it is nowadays possible in many European countries, giving the chance of certification under those new regulation for higher MTOW gyroplanes too.
We wont here to specify thot we ore not osking you to ollow this in whot we con define o IIblind woy", we ogree on supplying odequote onolysis thot proof structural resistance of the aircraft to high loads (e.g. 15 9 forward for a MTOW of 500 Kg.) .
Regarding the same matter we would like to draw your attention on an other data: this high resistance means an increase of weight. We would find very interesting to see an allowance of some more Kg. on the limit MTOW (approx 30 Kg.) against this proven structural reinforcement as for example there are some Kg. more allowed for the installation of floats
As you can see our main task is safety and we are now taking the liberty of writing you those comments just because new requirements will be issued and we would like to support the improvement of this aspect of the matter so to have more efficient means to reach this aim. That's way we are now stating again our total availability in supplying what is needed to proof resistance and safety even at higher MTOW compared to the standard UL category (500 Kg. as previously said)

General Comments

Para.

There are more that 230 of our products flying in the wor1d, a total "shakel'/ revolution of the regulations will take us to a stop that can mean, and it is quite likely to, a bankrupt of our company.
It will be in our interest to toke as soon as possible 011 the steps required to odopt ourselves ond to certify our compony ond our products occordingly to new regulotion; onywoy the chonce, if outhorised by You, of keep on working even in UL cotegory will allow us to meet the expenses reloted to this odjustments. We reolly hope thot regulotion will be issued in a woy odequote to the speciol rotorcroft thot a gyroplone is.

Response

Deferred. The linguistic discrepancies in the various translations of Annex II are acknowledged. The Agency agrees that a rotorcraft is an aircraft and cannot be called an aeroplane.

The object and purpose of Annex II of Reg. 1592/2002 is to exclude certain aircraft from the remit of the Agency. All linguistic versions of the Annex are deemed authentic. In case of divergent interpretations stemming from linguistic or translation problems, as in here, the intent of the drafter has to be assessed in the light of reg. 1592/2002.

This is a matter of judicial interpretation or revision by the decision-makers.
The Agency should issue an Opinion to the Commission to help in solving the issue.

90 / CAA UK

Comment

The paper requests comment on the possibility that CS-VLR may not meet the Essential Requirements, and the possible need to amend those requirements in respect of certain classes of aircraft. JAR/CS-VLR does not meet the essential requirements in a few areas. The code was derived from JAR-27 which itself is deficient in some areas. The essential requirements are applicable to large transport aircraft and reflect the environment and conditions under which they operate.

The conditions and environment under which smaller aircraft operate is not necessarily the same, hence not all of the essential requirements are relevant to the smaller aircraft. This has been the case for the past 50 years. A vast amount of good service experience has been gained in that time from tens of thousands of aircraft that more than adequately demonstrates that application of those requirements is unnecessary. Therefore based on past experience there is no safety case for applying the missing essential requirements.

Response

Deferred.

90 / CAA UK

Comment

Units and values of measurement have been converted to be compatible SI units in order to provide a level of EU standardisation. The practice in some instances is fatuous, and flies in the face of aviations accepted international conventions for the standard units used as a norm E.g. the conversion of knots to km/h for the measurement of airspeed. Such unconsidered changes can be very dangerous and have a negative impact on flight safety.

Response

Noted.
The comments received on this issue can be split up in four categories:
a.The non-SI alternative units knot, nautical mile and foot, allowed by ICAO Annex 5, should not be converted in SI units;
b.The conversions made, are not accurate enough;
c.Not all units are converted;
d.correcting of mistakes.

With regard to these comments the following remarks can be made:
a.The comment is agreed in principle, however it should be noted that ICAO Annex 5 allows the use of these non-SI alternatives, but lists the SI units as the “primary units” (see table 3-4 of Annex 5). Therefore the conversion to SI units in these cases is still valid, bearing in mind that the non-SI alternative units, quoted between brackets, may continue to be used.
b.As explained under 2. above the units were converted using the “equivalent tolerance” principle, which is believed to be the right approach in general. It is however noted that some of the figures in the airworthiness codes serve only as an input to calculations and do not reflect an actual requirement to be met (e.g. CS 25.415(a)). In such case the figure has to be treated as a figure with no tolerance, and the conversion should be as accurate as possible.
From some of the comments it is also clear that people have used the figures with “old” units with a tolerance that was not reflected in the figure. There may have been a good reason to do so, but it may also have been for no good reason. It will be necessary to review all the figures to check if the tolerance as implied by the figure is sufficient for the purpose of the requirement.
c.It is acknowledged that due to lack of time and resources it was not possible to convert the units in certain formula’s and in graphics. This is a task which needs to be taken up by the Agency.
d.The necessary corrections are made.

91 / SMA

Comment

The SMA company has already certified a piston engine for general aviation aeroplanes and has applied for certification of a piston engine for rotorcraft. Although our current engines might be too powerful for being considered for installation in CS-22, CS-VLA or CS-VLR aircraft, no one can

Para.

tell what the future will be.
As a designer of engines, we consider that the consistency of the various requirements used for engine certification is the prime factor to be considered. We do not design an engine for a too much specific application because of the costs for developping and certifying the engine : the same basic design should be capable of various aircraft installation.
Therefore, we recommand to put all certification specifications for engines in an unique document as it was proposed by EASA in the draft CS-E earlier submitted to comments. This is likely to improve the consistency of engine rules and this would facilitate the work of the engine industry which would refer to an unique document.

It must be noted that the currently proposed appendix B of CS-VLR cannot be used by an engine manufacturer for a separate engine certification because of the numerous cross references to the aircraft parts of CS-VLR. The proposed CS-VLR, written according to the concept of a certification of the engine as part of the aircraft, would not allow compliance with Part 21 which imposes a separate type certificate for the engine. If our suggestion above is not adopted, then we would suggest importing into CS-VLR the corresponding text of CS-E.

Response

Noted.
During the consultation for CS-E, CS-P, CS-22, CS-VLA, CS-VLR, the views of the commentators were requested on what is the most appropriate location for the certification specifications to be used for engine and propeller to be installed on powered sailplanes, very light aeroplanes (VLA) and very light rotorcraft(VLR)

The following points should be kept in mind:

The Basic Regulation 1592/2002 requires all products to have a Type Certificate. Engine and propeller of whatever size or design, are defined in the Regulation as products.
It is clear that the levels of safety intended by the current JAR-E (CS-E is based on JAR-E plus CS-22 subpart H plus appendix B of JAR-VLR) are higher than that intended by the engine requirements in JAR-22 and JAR-VLR (Used as the basis for CS-22 and CS-VLR).
It is important both that the Agency maintains this principle of the level of regulation being appropriate to the intended use of the product, and that this is clear to all interested parties.
It is important that the location of the requirements (whether in CS-E or CS-22 etc.) should not affect in any way the rigor with which compliance is both demonstrated and found.

Two solutions were offered:
1) To place such certification specifications in the certification specifications for engines (CS-E) and certification specifications for propellers (CS-P) (Consistency of engine and propeller texts being the main rationale).
2) To place such certification specifications in the aircraft certification specifications either directly (CS-22 and CS-VLR) or by cross-reference (CS-VLA) (Use of an aircraft system approach being the main rationale).

It should be noted that the issue was only related to the location : the texts were technically unchanged (only editorial changes).

A careful review of received comments does not show a clear majority in favour of one or the other solution. Both Authorities and Interested Parties are divided on the issue.

To find a solution for the first issue of all CS, the following was agreed:
-Solution 2 should be adopted because it complies with the general principle of transformation of JARs into CS (avoiding changes). Currently, the engine and propeller certification specifications for powered sailplane, VLA and VLR are included directly or by cross-reference in the corresponding JAR.

-However, the appendix B of JAR-VLR should be replaced by the corresponding text that was included into the draft CS-E circulated for comments. The latter is considered more adequate as specifications for a separate engine certification (imposed by EU Regulation 1592 and Part 21), avoiding the confusing numerous cross references to aircraft specifications.

92 / CAA Sweden

Comment

With reference to the Consultation Papers concerning certification specifications (CS) mentioned above (CS VLR and CS 23), we would like to make the following comments.

Since the proposed certification specifications contain regulatory material which, essentially, is presented as being identical to the content of the corresponding JARs, we are in favour of the proposed material.

However, should the proposals not have the same content as those JARs, there must be a possibility to rediscuss such items.

Response

Noted.
Further review may be carried out by the Agency. However, it should ne noted that all technical texts have been published by the JAA in accordance with JAR-11 for the standard 3 month comment period. All interested parties had the opportunity to provide comments.

102 / ENAC Italy

General Comments

Para.

Comment

Following discussion and agreement at the RSG, I would like to propose changes to the EASA Certification Specifications which were not originally adopted by the Core Group, but which are intended to resolve a long standing issue and to maintain harmonisation with the FAA.

Firstly, You will recall that rotorcraft "Critical Parts" was the subject of much debate and deliberations over the last few years. The original output from the Rotorcraft Critical Parts WG was not universally accepted and caused one NAA to send a formal letter of objection to the JAA. This initiated a follow-on activity to resolve the specific issues of controversy and resulted in revised AC material being developed which all parties accepted. This material has been formally approved by the FAA and published on their web site and is already in use by the JAA for an on-going validation programme. It would be in everyone's interest if this latest material provided the basis for showing compliance, and the original material referenced within the draft CSs was removed.

A second issue relates to acceptance of the latest AC material. Currently Book 2 of the draft CSs refer to AC 27-1B and AC 29-2C and not to the latest revision (Change 1) which was developed by the RSG under the terms of the FAA/JAA agreed "Rotorcraft AC Material, Revision Development and Acceptance Plan". Change 1 has been adopted by the FAA, but on the JAA side, two NPAs (27-19 and 29-25) have yet to receive formal approval. If this approval could be accomplished quickly, or the CSs were amended in anticipation of being approved, this would enable full harmonisation to be retained.

To progress these two issues, the following changes are proposed:

1.Amend page 2-0-1 of CS-VLR to refer to FAA AC 27-1B Change 1 and delete the date.
2.Amend page 2-0-1 of CS-27 to refer to FAA AC 27-1B Change 1.
3.Amend page 2-0-1 of CS-29 to refer to FAA AC 29-2C Change 1.
4.Delete AMC VLR-602, AMC 27.602 and AMC 29.602.
5.If there is likely to be any delay in publication of the CSs, then amend the JARs accordingly.

Response

Deferred. Only proposed changes 1 and 4 are related to VLR. There was no NPA to JAR-VLR. The Agency should publish an NPA as part of its future rulemaking programme.

B1-CS VLR.143

Para. ***(c)***

94 / CAA UK

Comment

In CS VLR.143(c), 17 knots has been converted to 8.7m/s whereas in CS VLR.175(d), 17 knots has been converted to 31 km/h. This discrepancy has probably arisen because .143(c) refers to a wind velocity rather than an airspeed and .175(d) refers to a speed. However, when the test points for .143(c) are flown, the aircraft is usually manoeuvred over the ground in zero wind at a ground speed of 17 knots. Hence, if we have to go with something other than knots, the consistent use of km/h would be more appropriate.

Response

Carried.

Para. ***(d)***

94 / CAA UK

Comment

The formula for disc rotor coefficient should be checked with the specialists who provided it (and preferably its derivation explained) as it contains differences compared with the formula presented in earlier drafts of JAR-VLR. It appears that a factor of 2 may have been lost at some stage during JAR-VLR's development and it would be inappropriate to promulgate incorrect information.

Rotor inertia (KE) is defined by a formula containing the term J, and then in the next line it is stated that J = rotor inertia.

Response

Noted.
The formula needs further checking by the specialist group. Until the moment that they have finalised the text the paragraph is reserved

B1-CS VLR.602

Para.

90 / CAA UK

Comment

AMC VLR.602 is a copy of the original ACJ text published in JAR-VLR, JAR-27 and JAR-29.

Rotorcraft Critical Parts has been the subject of much debate and deliberations over the last few years. The original output from the Rotorcraft Critical Parts WG was not universally accepted and resulted in the UK-CAA sending a formal letter of objection to the JAA and the formation of a follow-on HWG to resolve specific issues of controversy. The outcome from this HWG has been revised AC material which all parties have accepted.

The FAA has now formally approved and issued the new AC material and there is on-going work by the RSG to formally adopt this material within the JARs. The material is already being used by the JAA in the certification/validation process.

It would be in everyone's interest if this material could be included within the rotorcraft CSs (VLR, 27 & 29) as it provides greater clarity with respect to the rule, represents the agreed text which all parties have accepted, and would provide harmonisation both with the other CSs (if adopted) and with the associated FARs.

Response

Deferred. This will be part of the Agency's future rulemaking programme.

B1-CS VLR.903

Para. ***(a)***

74 / DGAC, France

Comment

Text of CS-VLR 903 (a)currently reads as "CS-VLR 903 Engine
(a) Engine type certification. The engine must meet the requirements stated in Appendix B to this CS. (See AMC VLR.903(a).)."

This conflicts with Part 21, paragraph 21A.21 (d) which imposes the engineTC prior to aircraft certification together with 21A.17 (a)(1) which states that the Agency will notify the certification basis for the engine. This clearly gives the Agency the decision on the requirements to be met by the engine for receiving its type certificate.Therefore, CS-VLR 903 (a) should read : "The engine must have a type certificate". Alternatively, because this simply duplicates 21A.21, CS-VLR 903 (a) could be deleted, as done in CS-25.

Response

Noted.

The text now reads:
(a) The engine must meet the specifications of Appendix B. (See AMC VLR.903(a)).

95 / Thielert Aircraft Engines GmbH

Comment

(a) Engine type certification. The engine must meet the requirements stated in Appendix B to this CS. (See AMC VLR.903(a).)

In common engine certification for VLA is handled by aircraft specialist. Due to the specific function and design of engines in general, Engine Certification should be handled by engine specialists who familiar with common engine design and engine related design requirements.

Therefore requirements regarding the engine should be part of the Certification Specifications CS-E.

3. PROPOSED TEXT/COMMENT:
(a) The engine must meet the requirements of CS-E.

Response

Noted.
During the consultation for CS-E, CS-P, CS-22, CS-VLA, CS-VLR, the views of the commentators were requested on what is the most appropriate location for the certification specifications to be used for engine and propeller to be installed on powered sailplanes, very light aeroplanes (VLA) and very light rotorcraft(VLR)

The following points should be kept in mind:

The Basic Regulation 1592/2002 requires all products to have a Type Certificate. Engine and propeller of whatever size or design, are defined in the Regulation as products.
It is clear that the levels of safety intended by the current JAR-E (CS-E is based on JAR-E plus CS-22 subpart H plus appendix B of JAR-VLR) are higher than that intended by the engine requirements in JAR-22 and JAR-VLR (Used as the basis for CS-22 and CS-VLR).
It is important both that the Agency maintains this principle of the level of regulation being appropriate to the intended use of the product, and that this is clear to all interested parties.
It is important that the location of the requirements (whether in CS-E or CS-22 etc.) should not affect in any way the rigor with which compliance is both demonstrated and found.

Two solutions were offered:

B1-CS VLR.903

Para. ***(a)***

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-However, the appendix B of JAR-VLR should be replaced by the corresponding text that was included into the draft CS-E circulated for comments. The latter is considered more adequate as specifications for a separate engine certification (imposed by EU Regulation 1592 and Part 21), avoiding the confusing numerous cross references to aircraft specifications.

other

Para. ***Appendix B***

74 / DGAC, France

Comment

If appendix B is not removed from CS-VLR (see other DGAC's comment), then its text should be improved as it was proposed in CS-E. As currently written, appendix B cannot be used by an engine manufacturer in order to obtain an independant type certificate for the engine because of all the cascading cross references to various paragraphs in "aircraft" part of CS-VLR. It is very difficult to determine exactly what the "engines" requirements are.

Response

Carried.

74 / DGAC, France

Comment

To be consistent with the comment raised on CS-E, DGAC considers that the Appendix B, which contains requirements for engine certification, should be removed from CS-VLR. The same requirements have already been proposed in CS-E.

If EASA needs to notify certification specifications for engines to be installed in a "VLR" aircraft, it would be logical to find them in a document titled "certification specifications for engines". This would provide a clear visibilty for the engine manufacturers who are required by Part 21 to get a type certificate for their engine.

Response

Noted.
During the consultation for CS-E, CS-P, CS-22, CS-VLA, CS-VLR, the views of the commentators were requested on what is the most appropriate location for the certification specifications to be used for engine and propeller to be installed on powered sailplanes, very light aeroplanes (VLA) and very light rotorcraft(VLR)

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other

Para. ***Appendix B***

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Para. ***editorial comments***

90 / CAA UK

Comment

a.GENERAL - There are a number of American spelling conventions used in the text. While these have generally been copied straight from JAR-VLR, in order not to promulgate these errors and provide consistency of spelling, these should be changed to standard English conventions.

Examples include:

b.CS VLR.1 - Editorial error"(See AMCJ VLR.1)"
c.CS.VLR 549 -Typo, 'JAR CS 549', should read 'CS.VLR 549'.

Response

Deferred. The necessary improvements will be made as part of the Agency's drafting convention.

Carried (editorials).

94 / CAA UK

Comment

1.CS VLR.51(a)(2) - Formatting error insert line between this para. And .51(b)
2.CS VLR.143(a)(2)(vii) - Formatting error- insert line between this para. And .143(b).
3.CS VLR.143(d)(ii) - formatting error- insert line between this para. And .143(e).
4.CS VLR.1305(o)- Typo:"fuel system".
5.AMC VLR 1 Applicability - There are a number of formatting errors and typos on this page.

Response

Carried.