

Comment Response Document (CRD)

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to the proposal of a regulation defining additional Swiss requirements for:
Glider towing by means of Ecolight Aircraft.

Section 1

Explanatory Note

I. General

1. The certification and validation of Swiss Ecolight aircraft is based on the requirements established by the German LTF-UL Issue 30.01.2003 and the “Additional requirements” defined by the Swiss Federal Office of Civil Aviation (FOCA). These documents do not contain specific requirements applicable to Motor Gliders to be certificated/validated as Ecolight Aircraft and do not fully address requirements applicable to glider towing by means of Ecolight aircraft.

The purpose of the Proposal was to define a set of requirements to adequately consider the subjects mentioned above.

II. Consultation

2. The Proposal was published on FOCA's web site on 11 Jan 2008

(<http://www.bazl.admin.ch/fachleute/01277/01278/index.html?lang=de>).

By the closing date of 11 March 2008, FOCA had received 15 comments from National Aviation Authorities, professional organizations and private companies and citizens: a list of the commenters is provided in Attachment 1.

III. Publication of the CRD

3. All comments received have been incorporated in Section 2 of this Comment Response Document (CRD) with the FOCA's responses.

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

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

The resulting text is provided in Section 3: changes to the proposed rules have been highlighted.

Section 2

Id		
C1	comment	ENGINE (Propeller) Some commenters indicated that the requirement to accept only certified propellers according to CS22 subpart J is not acceptable.
	response	<u>Partially Accepted</u> FOCA agrees that such propellers must not have a Type Certificate, but must comply with the requirements of CS22 Subpart J. In certain cases the required endurance and functional testing CS 22.1939 & 22.1941 may be waived if sufficient operational/service experience can be properly demonstrated.
C2	comment	ENGINE Some commenters indicated that the requirement to perform 50 flight hours is not acceptable.
	response	<u>Partially Accepted</u> FOCA agrees that such testing is not required, if sufficient operational experience can be properly demonstrated with that type of engine/installation. This requirement is necessary only for the first aircraft of the type (aim is to gain experience with new aircraft/engine installation). Subsequent aircraft of the same type do not need to fulfill this requirement.
C3	comment	STRUCTURE One commenter does not see any difference between normal operation and glider towing or flying school operations; therefore the introduction of a fatigue requirement beyond what established by LTF-UL is not accepted.
	response	<u>Not Accepted</u> Based on an accident (wing brake-up), FOCA identified that the LTF-UL (and the Ecolight) requirements are not adequate with regard to fatigue design, respectively such requirements are missing and need to be introduced in the codes. Higher stress levels than those given in AMC VLA.572(b)(1) need further fatigue evaluation and definition of additional inspection programs (and methods). The additional cost for showing compliance to the fatigue requirements (based on available tools / EXCEL sheets) is considered as negligible and the safety benefit far outweigh these additional costs. (See further information provided as Attachment 2)
C4	comment	DESIGN AND CONSTRUCTION Some commenters indicated that the requirement to accept only devices of an approved type is not accepted.
	response	<u>Accepted</u> FOCA agrees that such devices must not be of an approved type, but must comply with the appropriate requirements. In general terms any equipment has to comply with LTF-UL 1301. Moreover, the document issued by the German LSGB "Additional requirements for glider towing by means of Ultralight aircraft" contains a set of requirement based on which the towing equipment can be demonstrated to satisfy a minimum defined level of performance. Service experience will also be considered when properly documented.
C5	comment	POWER- PLANT INSTALLATION Some commenters indicated that both proposed requirements are not

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		acceptable.
	response	<p><u>Not Accepted</u></p> <p>LTF-UL 951 states: “das einwandfreie Arbeiten des Motors unter allen normalen Betriebsbedingungen” includes hot weather & cooling (interpretation). However, due to the high volatility of the unleaded AutoGas hot weather operation has to be considered. For unproblematic gravity feed design (e.g. high wing), compliance showing by service experience is accepted. For more critical designs (double suction pump R914), documented tests to be acquired. As a result of this review FOCA considers that additional requirements don't need to be established.</p>
C6	comment	<p>OPERATING INFORMATION</p> <p>Some commenters indicated that this information are already considered for conventional glider towing operations and addressed as part of the training for pilots towing gliders.</p>
	response	<p><u>Accepted</u></p> <p>FOCA considers these specific aspects pertinent to the definition of a comprehensive Operating Information data package; however FOCA agrees that additional requirements don't need to be established.</p>
C7	comment	<p>Some commenters have expressed concerns regarding the definition of the Applicability Date of the proposed additional requirements.</p>
	response	<p><u>Noted</u></p> <p>The proposed additional requirements apply to all applications for an Ecolight Aircraft Validation/Certification (including Changes and Repairs) submitted on or after the publication date of these additional requirements. It has to be remarked that FOCA may define or adopt mandatory actions to be performed on an aircraft to restore an acceptable level of safety, when evidence shows that the safety level of this aircraft may otherwise be compromised. The content of the mandatory actions shall be determined on a case by case basis.</p>
C8	comment	<p>Some commenters indicated that the document Annex II of LTF-UL provides the necessary set of requirements for the certification/validation of UL or Ecolight used for glider towing.</p>
	response	<p><u>Noted</u></p> <p>FOCA considers that the main reasons for introducing “additionally requirements” are safety concerns due to lack, incompleteness or inadequacy of the existing regulations. Consequently a set of technical requirements has been defined.</p>
C9	comment	<p>Many commenters have provided comments of general nature against the introduction of additional requirements on the basis of, just to mention some of them, cost considerations, small size of the Swiss market, non-effectiveness of a Swiss-only regulations, need for a simplification of the existing rules, etc..</p>
	response	<p><u>Noted</u></p> <p>These comments have been considered and analyzed. FOCA considers that the main reasons for introducing “additionally requirements” are safety concerns due to lack, incompleteness or inadequacy of the existing regulations. Consequently a set of technical requirements has been defined. FOCA considers that these general comments do not directly contribute to the definition of the technical requirements, nor do they prove that they are inadequate to the scope of providing an</p>

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		adequate level of safety. Therefore the proposed text will not be changed as a result of these comments.

Section 3
Resulting Text

Item	Additional Swiss requirements for glider towing by means of Ecolight Aircraft	Remarks References
ENGINE		
1	<p>Ensure at first that the engine and propeller are is type certificated according to JAR/CS-E and P or FAR-33 and 35.</p> <p>Propellers must comply with the requirements of CS22 Subpart J. Requirements CS 22.1939 & 22.1941 may be waived if sufficient operational/service experience can be properly demonstrated.</p>	<p>Identical but not certified engines may be accepted (for example ROTAX engine models)</p>
2	<p>Perform 50 flight hours after completion of flight testing.</p>	<p>Glider towing operation. Testing is not required, if sufficient operational experience can be properly demonstrated with that type of engine/installation. This requirement is necessary only for the first aircraft of the type (aim is to gain experience with new aircraft/ engine installation). Subsequent aircraft of the same type do not need to fulfill this requirement.</p>
STRUCTURE		
1	<p>Fatigue evaluation Fatigue aspects are not considered for UL aircraft. For towing aircraft, it is anticipated that a higher number of cycles will be performed and therefore additional work is needed.</p> <p>Therefore, fatigue aspects have to be considered for the following elements: - Wing spar and attachments - HTP attachments - Flap and flap fittings.</p>	<p>Reference 23.571 23.572 23.573</p> <p>AMC VLA 572(b)</p>

Item	Additional Swiss requirements for glider towing by means of Ecolight Aircraft	Remarks References
	Design must be performed using, AMC VLA 572(b) design allowable. For fittings and attachments design with stress allowable below endurance level of S/N curves must be shown	
DESIGN AND CONSTRUCTION		
1	<p>Release mechanisms There must be a release mechanisms installed to give the aerotow pilot the ability to quickly disconnect the aerotow formation.</p> <p>(a) The release mechanisms must be approved</p>	
2	<p>Tow cable retraction mechanisms If an aerotow cable retraction mechanisms is installed, it must be of an approved type.</p> <p>(a) The function of the rope cutting device must be demonstrated by ground testing</p>	
POWER- PLANT Installation		
1	Fuel system hot weather operation	§ 23.961
2	<p>Cooling tests To be performed according to Flight Test Guide item 245/248 (see book 2 of CS-23).</p>	§23.1041/1043/1047
OPERATING INFORMATION		
1	<p>Operating data and procedures Information concerning normal and emergency procedures for the tow other pertinent information necessary for safe operation must be furnished, including: Special attention for sailplanes with bottom tow hook installation tow upsets sailplanes types whose relevant characteristics are comparable to those types used in the flight tests landing procedure</p>	

Attachment 1

List of commenters

Aero-Club der Schweiz
Deutscher Aero-Club Luftsportgeräte
FOCA-LEUW
LBA Referat T4
Messrs: F. Einführer, A. Gabus, B. Hinz, J. Konrad, P. Von Burg
SFG Biel – Gruope de vol à voile de Courtelary
SFG Freiburg
SFG Zürich
SFVS Segelflugverband der Schweiz
SMF Swiss Microlight Federation
Vol à Voile Club Valais

Attachment 2

Fatigue requirements – additional comments

- Bauvorschriften LTF-UL :

Aufgrund eines Unfalls (wing break-up) ergeben sich unweigerlich Fragen in Bezug auf die Bauvorschriften.

Die Festigkeitsanforderungen LTF-UL sind dahingehend als ungenügend zu betrachten, dass bei der 'Zulassung' (zB. im Belastungsversuch) nur gerade 'ultimate-load' nachgewiesen werden muss.

D.h. die Konstruktion muss nur für diese Last dimensioniert sein. Aufgrund der so vorhandenen hohen resultierenden Spannungen im Holmgurt und den Anschlussbeschlägen muss das Betriebsverhalten als kritisch beurteilt werden. Die resultierende Lebensdauer der Konstruktion ist daher sehr kurz.

Für die UL's die so dimensioniert sind, kann keine lange Lebensdauer erwartet werden! Die Anforderungen bezüglich Ermüdungsfestigkeit in den Bauvorschriften LTF-UL sind im Vergleich zu den FAR/CAR 23 und JAR-VLA ungenügend :

Hier eine kurze Gegenüberstellung :

FAR/CS 23	§ 23.572	<i>Metallic wing, empennage and associated structures those parts whose failure would be catastrophic, must be evaluated</i>
	§ 23.573	<i>for composite structures : damage tolerance analysis</i>
JAR-VLA	§ .572	<i>Parts of structure critical to safety must be identified and must have strength capabilities to achieve adequate safe life. According ACJ 572(b) max.allowable (reduced) stress levels for design are given.</i>
LTF-UL	§ .627	<i>Der Festigkeitsverband muss so gestaltet sein, dass Spannungshäufungen und hohe Spannungen vermieden werden.... die Primärstruktur muss ohne Schwierigkeiten überprüfbar sein.</i>

Gegenüber den JAR-VLA [ACJ 572(b) siehe Appendix A] sind die unter LTF-UL geforderten Festigkeitsreserven für Aluminiumkonstruktionen um 33% !!! geringer.

Was dies für die Betriebsfestigkeit bedeutet ist uns allen klar !!!

Die LTF-UL Vorschriften enthält lediglich folgende Forderung :

- *Der Festigkeitsverband muss so gestaltet sein, dass Spannungshäufungen und hohe Spannungen vermieden werden*

Mittels einer Sicherheitsempfehlung sollen zusätzliche Forderungen (Ergänzungen der LTF-UL Bauvorschriften gemäss JAR-VLA § .572 ACJ 572(b) siehe Appendix A) gefordert werden.

- Reference CS-VLA :

AMC VLA 572 (b)

Parts of Structure Critical to Safety (Interpretative Material and Acceptable Means of Compliance)

1) The use of the following stress levels may be taken as sufficient evidence, in conjunction with good design practices to eliminate stress concentrations, that structural items have adequate safe lives:

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Allowable normal stress level at maximum limit load

- Glass rovings in epoxy resin 25 daN/mm²
- Carbon fibre rovings in epoxy resin 40 daN/mm²
- Wood According to ANC-18*
- Aluminium Alloy Half of rupture tensile strength
- Steel Alloy Half of rupture tensile strength

2) Higher stress levels need further fatigue investigation using one or a combination of the following methods:

- a. By a fatigue test, based on a realistic operating spectrum.
- b. By a fatigue calculation using strength values which have been proved to be sufficient by fatigue tests of specimens or components.

*ANC-18 is the ANC Bulletin 'Design of wood aircraft structures'; issued June 1944 by the Army-Navy-Civil

Committee on Aircraft Design Criteria (USA).