Notice of Proposed Amendment 2013-05

Regular update of CS-LSA

RMT.0003 (LSA.001) — 15/04/2013

EXECUTIVE SUMMARY

This NPA incorporates two main changes to Certification Specifications applicable to Light Sport Aeroplanes (CS-LSA).

First of all it proposes to introduce revisions of the existing referenced ASTM Standards in the CS-LSA. One of the revisions of the referenced ASTM standards introduces a change that addresses the safety recommendation of an accident that occurred on 25th June 2011 and shows the efficiency of the revision process of ASTM standards followed by the shortened process used by the Agency to introduce such a revised standard into CS-LSA.

Secondly, it proposes to introduce a new ASTM Standard for Certification Specifications for the design and manufacture of electric propulsion units.

Because the ASTM standards are consensus standards that are developed through a balloting and review process that allows stakeholders to participate in their development, the EASA consultation and adoption of ASTM standards is shortened to one month.

With respect to harmonisation with the FAA, the referenced ASTM standards are also used by the FAA in the US Light Sport Aircraft Rules and are published in a Notice of Availability (NOA) on the Federal Registry. Although the European regulatory system is different from the US LSA system, the content of these technical consensus standards is as much as possible harmonised.

Applicability	
Affected regulations and decisions:	CS-LSA ED Decision 2011/005/R
Affected stakeholders:	Applicants for a new TC or significant major changes to aeroplanes applying CS-LSA
Driver/origin:	Level playing field
Reference:	N/A

Process map	
Concept Paper:	No
Terms of Reference:	29/08/2012
Rulemaking group:	No
RIA type:	Light
Technical consultation during NPA drafting:	No
Duration of NPA consultation:	1 months
Review group:	No
Focused consultation:	No
Publication date of the Decision:	2013/Q3

TABLE OF CONTENTS

A. Procedural information

I. How to read this NPA

This NPA contains the following chapters:

A = Procedural information addressing the legal requirements and the consultation process
B = Explanatory note to support the draft rules
C = Regulatory Impact Assessment
D = Draft rules

Book 1 on Certification Specifications
Book 2 on Acceptable Means of Compliance

II. The rule development procedure

The European Aviation Safety Agency (hereafter referred to as the 'Agency') developed this Notice of Proposed Amendment (NPA) in line with Regulation (EC) No 216/2008[1] (hereafter referred to as the 'Basic Regulation') and the Rulemaking Procedure MB 01-2012[2] established by the EASA Management Board.

This rulemaking activity is included in the Agency's Rulemaking Programme for 2013-2016. It amends the Certification Specifications for Light Sport Aeroplanes (CS-LSA) that is part of the rulemaking task RMT.0003 (LSA.001).

The text of this NPA has been developed by the Agency, based on the new standard and changes to standards that have been developed and accepted by the ASTM F37 Technical Committee. The ASTM process for development and changes to ASTM standards is an open and transparent process allowing stakeholders participation, resulting in a consensus standard. The Agency is member of the ASTM F37 Technical Committee and has been involved in the development of the changes and the new standard. Because of the involvement of stakeholders and consultation process in ASTM, the Agency considers that it can shorten the consultation period of this NPA. This NPA is submitted for a 1 month consultation of all interested parties in accordance with Article 52 of the Basic Regulation and Articles 5(3) and 6 of the Rulemaking Procedure.

III. How to comment on this NPA

1. Comments on this NPA may be submitted to the Agency within 1 month as of the date of publication.
2. Please submit your comments using the **automated Comment-Response Tool (CRT)** available at **http://hub.easa.europa.eu/crt/**.[3]
3. The deadline for submission of comments is **15 May 2013.**

[1] 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). Regulation as last amended by Commission Regulation (EU) No 6/2013 of 8 January 2013 (OJ L 4, 9.1.2013, p. 34).

[2] EASA MB Decision 01-2012 of 13 March 2012 amending and replacing MB Decision 08-2007 concerning the procedure to be applied by the Agency for the issuing of opinions, certification specifications and guidance material ('Rulemaking Procedure').

[3] In case the use of the Comment-Response Tool is prevented by technical problems please report them to the CRT webmaster (crt@easa.europa.eu).

IV. The next steps in the procedure

Following closure of the NPA consultation period, the Agency will review all comments and if required conduct a focussed consultation on specific remaining open issues.

The outcome of the NPA consultation as well as the focussed consultation will be reflected in a Comment Response Document (CRD). The Agency will publish the Decision for the revision of CS-LSA together with the CRD. The publication of the Decision is expected in quarter 2 of 2013.

B. Explanatory Note

I. Legal framework

As part of the legislative process leading to Agency establishment, the Basic Regulation requires the Commission to adopt a comprehensive framework of rules for the implementation of the essential requirements. In the field of initial airworthiness, the implementing rules are contained in the Commission Regulation (EC) No 748/2012[4], (hereinafter referred to as 'Part 21').

Pursuant to the Basic Regulation the Agency shall, where appropriate, issue Certification Specifications, Acceptable Means of Compliance and Guidance Material for the application of the Basic Regulation and its Implementing Rules.

Certification Specifications (CS) are technical standards adopted by the Agency indicating means to show compliance with the Basic Regulation and its Implementing Rules and which can be used by organisations for the purpose of certification.

II. Issue to be addressed: The need for a revision of CS-LSA

The initial issue of CS-LSA refers to a number of ASTM standards that define the technical content of the CS. Since the publication of the first issue of CS-LSA revisions to some of these standards have been introduced by the ASTM F37 technical Committee for Light Sport Aircraft. The table below identifies the ASTM standards and their revisions that are introduced in CS-LSA by this NPA. Because some of the referenced standards were revised more than once since the initial issue of CS-LSA, this NPA covers also all the intermediate revisions of these standards.

CS-LSA Current referenced standard	Revision for adoption in this NPA	Title
F2245-10c	F2245-12d	Design and Performance of a Light Sport Airplane
F2483-05	F2483-12	Maintenance and the Development of Maintenance Manuals for Light Sport Aircraft
F2746-09	F2746-12	Standard Specification for Pilot's Operating Handbook (POH) for Light Sport Airplane
F2339-06		Design & Manufacture of Reciprocating Spark Ignition Engines
F2506-07	F2506-10	Design and Testing of Fixed-Pitch or Ground Adjustable Light Sport Aircraft Propellers
F2538-07a		Design & Manufacture of Reciprocating Compression Ignition Engines
F2316-08	F2316-12	Airframe Emergency Parachutes for Light Sport Aircraft
	F2840-11	Design and Manufacture of Electric Propulsion Units

Who is affected

[4] Commission Regulation (EU) No 748/2012 of 03 August 2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations *(OJ L 224, 21.8.2012, p.1-85).*

Applicants of significant major changes to aeroplanes or new type certificates referring to CS-LSA in the type certificate basis will be affected by the revisions of the referenced ASTM standards.

Safety concerns

The following safety recommendations that were identified by accident investigations have been addressed by changes to the ASTM standards. Until CS-LSA is amended and refers to these revised ASTM standards, Special Conditions will be applied by the Agency to address these safety recommendations.

In reaction to the safety recommendations from the UK Air Accidents Investigation Branch (AAIB) provided below, requirements for a fuel strainer have been added to the standard. The safety recommendations were based on findings from an accident in 2011 with a LSA operated in England. Fuel flow was blocked due to an object at the fuel tank outlet. Investigation of the aircraft did show that the design did not incorporate a fuel strainer at the tank outlet. The strainer would have been the only filtering means to prevent fuel line blockage in such a case. Those strainers are standard recommended practices in all other aircraft categories and have proven to work satisfactorily, without adding system complexity.

Safety Recommendation 2012-020

It is recommended that the European Aviation Safety Agency (EASA) amend 'Certification Specifications for Light Sport Aeroplanes' (CS-LSA) to require the installation of a strainer at the fuel tank outlet, to reduce the risk of foreign objects in the fuel tank restricting the fuel supply.

Safety Recommendation 2012-021

It is recommended that ASTM International amend the 'Standard Specification for Design and Performance of a Light Sport Airplane' (ASTM F2245) to require the installation of a strainer at the fuel tank outlet, to reduce the risk of foreign objects in the fuel tank restricting the fuel supply.

Following repeated accidents with ZODIAC CH 601 XL Light Sport Aircraft, the FAA issued a Special Review Report[5] in January 2010 that included a number of recommendations for improvement to and clarification of the ASTM standard F2245 at revision 07a which was the certification basis for the subject aeroplane type. The report also reiterated recommendations previously issued by NTSB. The recommendations and clarifications were discussed in the F37 technical committee, and resolved with the consent of the FAA. The resulting improvements were introduced into the standards in the revisions issued following F2245-7a. Some key items in this revision are:

- Requirement for airspeed indication system including permissible deviations
- Introduction of an Operating Manoeuvering Speed
- Introduction of the Max Zero Wing Fuel Weight
- Introduction of a quantitative stick force requirement
- Further refinements in other sections.

Another recommendation asking for more precise flutter requirements is still under discussion in the ASTM committee. The Agency already added, and will keep requirements from the initial issue of CS-LSA, to address this concern.

III. Objectives

The general objectives of the Basic Regulation are to establish and maintain a high uniform level of civil aviation safety in Europe while promoting cost-efficiency and level playing in the regulatory and certification processes.

[5] http://www.faa.gov/aircraft/gen_av/light_sport/media/Zodiac.pdf

The specific objective of this NPA is to update Certification Specifications for Light Sport Aeroplanes within the European system that set an acceptable level of safety, are cost-effective and provide a level playing field throughout Europe. This update of CS-LSA also promotes global harmonisation by referring to the ASTM standards that are also accepted for LSA in the US.

IV. Summary of changes to CS-LSA

A summary of the most important changes to the standards, and the Agency's rationale for accepting these changes is provided below. More details of the discussions and ballots for these changes are available in the ASTM F37 Technical Committee Work Items on the ASTM F37 Technical committee internet pages.

Note: Substantial changes to the ASTM standards that are adopted by the Agency are explained below. They are listed in the order of the paragraph numbering in the standard. When changes in the standard result in a change in the associated Subpart of CS-LSA, this is explained in *Italic print* directly following the change in the standard. Editorial changes in the standards are not highlighted and accepted as such.

Revision from F2245-10c to F2245-12d Design and Performance of a Light Sport Airplane

Highlights of changes from F2245-10c to **F2245-12d**.

2.1 A reference to ASTM F5206 'Specification for Design and testing of Fixed-Pitch or ground Adjustable Light Sport Aircraft propellers' is added. The Agency already accepted this standard in CS-LSA independent from F2245. There is therefore no actual change to the current CS-LSA.

A reference to F2564 'Specifications for Design and Performance of a Light Sport Glider' is added that is used in the Annex A1. 'Additional Requirements for Light Sport Airplanes used for towing'. The F2564 standard has no impact on the requirements for the aeroplanes certified to CS-LSA.

2.3 With the reference to the standards for propellers, also the reference to the EASA CS-P (propellers) is added.

3.2.35 A new definition is introduced 'V_O Operating manoeuvring speed' that is used in the new section 9.3.

3.2.47 To protect against non-conservative assumptions about credit for fuel in wing tanks, a definition 'W_{ZWF} maximum zero wing fuel weight' is introduced and used in the new requirement 5.2.1.3.

4.2.1 The minimum useful load paragraphs have been re-drafted. Instead of using the rated engine power as a discriminant for the minimum useful load, this is now determined based on the number of persons and the weight of the consumable substances, such as fuel, needed for a 1 hour level flight at V_H.

CS-LSA Subpart B

The requirements 4.2.1.3 is removed from the table of differences in CS-LSA since the intend is now covered by the change to 4.2.1.

4.5.2.3 A new requirement is introduced to require that the control force to achieve the positive limit manoeuvring load factor (n1) shall not be less than 70 N in the clean configuration at the aft center of gravity limit. The control force increase is to be measured in flight from an initial n=1 trimmed flight condition at a minimum airspeed of two times the calibrated maximum flaps up stall speed.

4.5.2.4 If flight tests are unable to demonstrate a manoeuvring load factor of n1, then the minimum control force shall be proportional to the maximum demonstrated load factor, n_{1D}, as follows:

$$f_{min} \geq 70N\left(\frac{n_{1D}-1}{n_1-1}\right)$$

CS-LSA Subpart B

The requirements 4.5.2.3 and 4.5.2.4 are removed from the table of differences in CS-LSA since they are now covered by the revised F2245 standard.

5.1.2.2 The wording in the ultimate load factors table is amended in-line with the change to 8.5 and 6.10.2. Factors are unchanged.

5.2.1.2 The term 'disposable load' is replaced by 'critical weight' to more precisely convey the intention of this section. The new language requires the designer to consider all load cases possible within the operating limits specified in the POH, and decide what constitutes the critical weight distribution.

5.2.1.3 A new section is introduced to determine the maximum allowable weight of the airplane without fuel in the wing tank(s) if this would be less than the maximum design weight.

5.10.1 The wording of 'seat belt and harness' has been changed to 'lap belt and at least one shoulder harness' consistent with the change of 8.5.

6.10.2 The requirement for lap belts, harnesses and baggage restraints and their attachments is amended to make users aware of the special safety factor in 5.1.2.2 and in more detail explain the required testing. Also references to acceptable TSO and other standards is included that meet equal or higher loads than prescribed by this ASTM requirement.

6.11 New Airspeed indication system calibration requirements are introduced that are equivalent to the requirements in CS-VLA 1323.

6.12 The former 6.11 'Landing Gear Retracting Mechanism' requirements in the table of differences in CS-LSA are re-numbered to 6.12 because of the introduction of 6.11 in the revised standard.

6.13 The former 6.12 'Floats and Hulls' requirements in the table of differences in CS-LSA are re-numbered to 6.13 because of the introduction of 6.11 in the revised standard.

7.2 The requirement is amended to include that a propeller complying with the ASTM F2506 standard is acceptable. The Agency already accepted F2506 in CS-LSA as individual standard, without the reference to it in F2245.

7.3.7 In reaction to a safety recommendation from the UK AAIB requirements for a fuel strainer have been added to the standard.

CS-LSA Subpart B

The requirements 7.1 through and including 7.1.3.3 are removed from the table of differences in CS-LSA and covered by in the re-drafted and new requirements 7.1 through 7.1.3.3.

7.6.1 The minimum thickness for Stainless steel used for the firewall is reduced from 0.46 mm (0.018 inch) to 0.38 mm (0.015 inch). This is consistent with the requirement in CS-VLA and accepted without deviation in CS-LSA.

8.5 The wording of 'seat belt and harness' has been changed to 'lap belt and at least one shoulder harness' to clarify the need for a pelvic restraint and the additional shoulder harness.

9.1.6 Marking for the occupant safety restraint system has been added.

9.3 A new section is introduced to establish an operation manoeuvring speed that adequately protects the structure from full or abrupt single control inputs in pitch.

F2245-12d Annex A1 Additional requirements for Light Sport Airplanes used to tow gliders.

In the initial issue of CS-LSA the F2245 Annex A1 was exempted. Changes have been made to the Annex A1, especially with regard to the performance requirement A1.2.3, that result in the introduction of the Annex A1 in CS-LSA.

A1.2.3 Higher climb rate requirements (90 m/min) are set for towing of type certified sailplanes, powered sailplanes and Light Sport Gliders that comply with the specifications F2564.

A1.6.1.4(2) The requirement is clarified so that a released cable will clear the aircraft structure and control surfaces at full travel in each direction as prescribed in the test introduced in A1.6.1.7.

A1.6.1.7 This new requirement provides the test for released cable clearance with the aeroplane. It also allows reduction of the angles defined in A1.6.1.3(2) when it can be substantiated by tests or experience that this is safe and conservative for the specific aeroplane.

A1.7.1.4 Limitations for glider towing are introduced when A1.2.3 is not complied with.

CS-LSA Subpart B

Based on the extensive experience in Europe with light aeroplanes (VLA, Touring Motor Gliders, Microlight) used to tow gliders even heavier than the tug aeroplane and the existing requirements and special conditions the following changes to Annex A1 of ASTM 2245–12d are proposed in the table of differences:

A1.2.4 A minimum requirement for the take-off distance.

A1.3.2 A Stall Warning for the tow condition.

A1.6.1.4(3) Accept a higher maximum force for the release of the tow cable as the minimum force on the cable will be increased.

A1.6.1.5 Add requirements on the location and marking of the release handle.

A1.6.1.6 Increase the minimum strength of the weak to 300 daN (674.4 lb).

A1.6.1.8 A device to have full and unrestricted view to the glider is required.

A1.7.1.1 Also the minimum permissible towing speed to be documented in the manual.

A1.7.1.5 The minimum and maximum tow rope length and the tow rope flexibility have to be defined.

Also AMC is added in CS-LSA Book 2 AMC Subpart B — Standard Specification for Design and Performance of a Light Sport Aeroplane — to Annex A1 of F2245-12d on the applicability and extend of necessary testing for tow aeroplanes.

Revision from F2483-05 to F2483-12 Maintenance and the Development of Maintenance Manuals for Light Sport Aircraft

Highlights of changes from F2483-05 to **F2483-12**.

A new Annex A1 for LSA Major repair and alteration (MRA) requirements was introduced. The CS-LSA in the European regulatory framework are the Certification Specifications for Light Sport Aeroplanes and do not cover procedural issues regarding changes. These are covered by the applicable implementing rules in 748/2012 Part 21. Therefore the new Annex is not applicable and marked as 'delete' in the table of differences.

Revision from F2746-09 to F2746-12 Standard Specification for Pilot's Operating Handbook (POH) for Light Sport Airplane

For consistency with F2245-12d that introduces the new definition of V_O and the W_{zwf}, F2746-09 has also been revised by ASTM. Changes have been incorporated into the table of differences in Subpart G of CS-LSA as shown in paragraph D of this NPA.

Revision from F2506-07 to F2506-10 Design and Testing of Fixed-Pitch or Ground Adjustable Propellers

Highlights of changes from F2506-07 to **F2506-10**.

3.1.3 A new definition is introduced for a 'conventional fixed pitch propeller' which is a one-piece fixed pitch propeller that is constructed of material such as wood or metal that has no abrupt changes in material properties as the blades transition through the hub area.

6 Simplified test and inspection requirements for conventional fixed pitch propellers have been introduced and the chapter 6 Tests and Inspections was modified to implement these changes and clarify the applicable requirements.

Revision from F2316-08 to F2316-12 Standard Specification for Airframe Emergency Parachutes

Highlights of changes from F2316-08 to **F2316-12**.

Title The wording 'Light-Sport Aircraft' is removed from the title to allow future use for other categories of aircraft.

1.1 The scope of this standard is explained in more detail and excludes airframe emergency aerodynamic decelerators not specifically intended for safely lowering the airframe and occupants to the ground.

1.3 A new paragraph 1.3 has been introduced that emphasises that airframe emergency parachutes are supplemental safety devices used at the discretion of the pilot when deemed to provide the best chance of survivability. As a consequence the current paragraph 1.3 is re-numbered as 1.4.

2 References to FAA documents have been removed and therefore there is no more need to exclude this paragraph in CS-LSA.

3 A number of definitions have been included.

6.2.1.2 Definition of the conditions for the ultimate load test of the parachute assembly now allows to distinguish between two cases. When the deployment is done with an actual aircraft, test mass and test speed must be enhanced by the same factors that in previous revision of F2316-08. When testing with a dead weight, these mass and speed factors do not apply. This is because of the nature of the dead weight drop test that has no effective load relief from aerodynamic or inertia effects like on a real aircraft when rotating or pitching in response to the parachute loads.

Furthermore, the standard has been significantly cleaned up, mistakes in references of the old standard removed and the required interaction between airframe and parachute manufacturer has been clarified.

Introduction of F2840-11 Design and Manufacture of Electric Propulsion Units

ASTM published F2840-11 with minimum requirements for the design and manufacture of Electric Propulsion Units (EPU) for Light Sport Airplanes. The EPU includes wiring and electronic storage devices (ESD) as well as battery management system and monitoring devices.

The interfaces between engine and installation is not following traditional definitions and not yet supported by practical experience. The installation of electric propulsion units might be subject to additional EASA Special Conditions, e.g. the standard is already mentioning EASA CRI F-58 Lithium Battery Installations.

C. Regulatory Impact Assessment (RIA)

This RIA analyses two options to address the issue and objectives identified in the previous chapter.

I. Options considered to address the main issue

Option 0 – Do nothing

The identified options for this subject would be to continue using the presently available Certification Specifications.

Option 1 – Revise the presently available Certification Specifications and follow ASTM Standards revisions.

Develop rules reflecting the present state of the art and the best practices in this field (see section VIII. Summary of proposed changes to CS-LSA).

II. Analysis of impacts

Safety

The revisions of the referenced ASTM standards are partly because of safety concerns and from that point of view could be interpreted as having a safety impact. This is, however, not the case because the mitigation of safety risks is addressed by the Agency by issuing Special Conditions that complement the current Certification Specifications for LSA. It will however improve transparency and common understanding of the certification requirements when these amendments are introduced in the CS instead of keeping those in special conditions.

Environmental and social impacts

The introduction of the standard for electric propulsion units is expected to promote the development of these propulsion units that will have a positive impact on the environment.

Economic

Option 0

If the CS-LSA does not follow the revisions of the referenced ASTM standards the accepted standards in the US Light Sport Aircraft system will divert more and more from CS-LSA. This will have a detrimental economic effect on aircraft that are developed for both the European and US market.

Option 1

The amendment of CS-LSA, following the revisions of the referenced ASTM standards, will have a positive economic effect because it achieves a higher level of harmonisation between the European LSA requirements and the US Light Sport Aircraft.
The Option 1 will also improve transparency and common understanding of the certification requirements when these amendments are introduced in the CS instead of keeping those in special conditions. The applicants and EASA will save time during the certification process.

Regulatory coordination and harmonisation

The Agency as well as the FAA participate in the ASTM F37 Technical Committee to develop consensus standards that are acceptable to both the European and the US aviation systems. Close coordination is achieved via the ASTM standards development process. Even when the European system (Certified aeroplanes) is different from the US Light Sport Aircraft system (Self declaration of compliance to the ASTM standards), the technical specification for airworthiness are as much as possible harmonised. Adoption of these standards and their revisions is in the European system through this NPA process, while the FAA publishes the

accepted standards on the Federal registry in a Notice of Acceptance. This results in a slightly out of sync publication of the acceptance of revised or new ASTM standards by the Agency and the FAA. The Agency and FAA, however, coordinate and the Agency uses the flexibility from article 6 of the Rulemaking Procedure to expedite the adoption of consensus standard revisions.

III. Conclusion and preferred option

Based on this RIA, the revision to CS-LSA, as proposed in this NPA (Option 1) is considered as having a positive economic and environmental impact. Maintaining the global harmonisation of consensus standards for Light Sport Aeroplanes is a key element in the efforts to reduce the costs and administrative burden on General Aviation.

D. Proposed revision of CS-LSA

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

1. deleted text is shown with a strike through: ~~deleted~~
2. new text is highlighted with grey shading: new
3. … indicates that remaining text is unchanged in front of or following the reflected amendment.

European Aviation Safety Agency

Certification Specifications for Light Sport Aeroplanes

CS-LSA

Amendment 1
xx Month 201X

CONTENTS

CS-LSA — Light Sport Aeroplanes

BOOK 2 — ACCEPTABLE MEANS OF COMPLIANCE

AMC Subpart A — General

AMC LSA.5 Applicability

AMC Subpart B — Standard Specification for Design and Performance of a Light Sport Aeroplane

AMC to ASTM F2245-~~10c~~ 12d§6.2Materials

EASA Certification Specifications for Light Sport Aeroplanes

CS-LSA Book 1

Certification Specifications

Subpart A — General

CS-LSA.5 Applicability

This Certification Specification is applicable to Light Sport Aeroplanes to be approved for day-VFR only that meet all of the following criteria:

(a) A Maximum Take-Off Mass of not more than 600 kg for aeroplanes not intended to be operated on water or 650 kg for aeroplanes intended to be operated on water.

(b) A maximum stalling speed in the landing configuration (V_{S0}) of not more than 83 km/h (45 knots) CAS at the aircraft's maximum certificated Take-Off Mass and most critical centre of gravity.

(c) A maximum seating capacity of no more than two persons, including the pilot.

(d) A single, non-turbine engine or electric propulsion unit fitted with a propeller.

(e) A non-pressuri~~z~~sed cabin.

CS-LSA.10 Referenced Standards

The ASTM Standards referenced in this specification must be applied in the following revision:

F2245-~~10c~~ 12d Design and Performance of a Light Sport Airplane

F2483-~~05~~12 Maintenance and the Development of Maintenance Manuals for Light Sport Aircraft

F2746-~~09~~12 Standard Specification for Pilot's Operating Handbook (POH) for Light Sport Airplane

F2339-06 Design & Manufacture of Reciprocating Spark Ignition Engines

F2506-~~07~~ 10 Design and Testing of Fixed-Pitch or Ground Adjustable Propellers

F2538-07a Design & Manufacture of Reciprocating Compression Ignition Engines

F2316-~~08~~ 12 Airframe Emergency Parachutes for Light Sport Aircraft

F2840-11 Design and Manufacture of Electric Propulsion Units

The above referenced Documents are available from ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA, 19428-2959 USA.
http://www.astm.org

Subpart B — Standard Specification for Design and Performance of a Light Sport Aeroplane

CS-LSA.15 Applicable Specifications

The aeroplane must be shown to comply with ASTM F2245-~~10c~~ 12d including all Annexes and Appendices, except as modified by the following table:

Action	**Requirement to be read as follows:**
Modify	1.2 This specification is applicable to aeroplanes intended for 'non-aerobatic' and for 'VFR day' operation only. Non-aerobatic operation includes: (1) Any manoeuvre incidental to normal flying; (2) Stalls (except whip stalls); and (3) Eights, chandelles, and steep turns, in which the angle of bank is not more than 60°. (4) Spinning for aeroplanes complying with 4.5.9.2.
Delete	1.3
Delete	3.1.4 and 3.1.4.1
Add	4.1.3 When the aircraft is equipped with a variable pitch propeller and/or a retractable landing gear, the various configurations of those devices have to be considered, as applicable.
~~Add~~	~~4.2.1.3 The maximum empty weight W_E (N) as defined in 3.1.2 and 4.2.1 shall be determined. W_E shall be provided as an operational limitation for the aircraft.~~
Add	4.3.2 A propeller that can be controlled in flight but does not have constant speed controls must be so designed that: 4.3.2.1 4.3.1 is met with the lowest possible pitch selected for the take-off and climb case, and 4.3.2.2 4.3.1 is met with the highest possible pitch selected for the glide case.
Add	4.3.3 A controllable pitch propeller with constant speed controls must comply with the following requirements: 4.3.3.1 With the governor in operation, there must be a means to limit the maximum engine rotational speed to the maximum allowable take-off speed, and 4.3.3.2 With the governor inoperative, there must be a means to limit the maximum engine rotational speed to 103 % of the maximum allowable take-off speed with the propeller blades at the lowest possible pitch and the aeroplane stationary with no wind at full throttle position.
~~Add~~	~~4.5.2.3 The control force to achieve the positive limit manoeuvring load factor (n1) shall not be less than 70 N in the clean configuration at the aft centre of gravity limit. The control force increase is to be measured in flight from an initial n = 1 trimmed flight condition at VC.~~ ~~4.5.2.4 If flight tests are unable to demonstrate a manoeuvring load factor of n1, then the minimum control force shall be determined using the ratio of n1 to the~~

	~~demonstrated load factor. Control forces and gradients shall not be extrapolated by more than 0.5g beyond the demonstrated load factor.~~
Modify	4.5.7 Wing level stall and stall warning 4.5.7.1 It shall be possible to prevent more than 20° of roll or yaw by normal use of the controls during the stall and the recovery at all weight and CG combinations. 4.5.7.2 A stall warning can be omitted when, during stalling in level flight: 4.5.7.2.1 It is possible to initiate and correct a roll motion using aileron control alone while maintaining rudder control at neutral position; and 4.5.7.2.2 The aeroplane does not have a noticeable tendency to drop one wing while aileron and rudder controls are held neutral. 4.5.7.3 On aeroplanes that do not meet requirements under 4.5.7.2: 4.5.7.3.1 In both straight and turning flight with flaps and landing gear in any normal position, a clear and distinctive stall warning must exist; 4.5.7.3.2 The stall warning must not occur at normal operating speeds, but must occur sufficiently before the stall to allow the pilot to regain level flight; 4.5.7.3.3 The stall warning may be furnished either through the inherent aerodynamic qualities (e.g. buffeting) of the aeroplane or by a device that clearly indicates the stall.
Add	4.6.1 Ground Vibration Test — For aircraft with a Vne exceeding 200 km/h (108 kt) a ground vibration test with subsequent analysis of the vibration modes and frequencies and potential flutter cases must show the aircraft to be free from flutter before verification in flight. 4.6.2 This ground vibration test and analysis may be omitted when there is clear reason to assume freedom of flutter due to compliance with all of the following: (1) Reasonable analysis following the Airframe and Equipment Engineering Report No 45 (as corrected) 'Simplified Flutter Prevention Criteria' (published by the Federal Aviation Administration) shows the aircraft to be free from flutter risk; (2) The airplane does not have T-tail, V-tail or boom-tail or other unconventional tail configurations; (3) Is equipped with fixed fin tail surfaces; (4) Does not have significant amount of sweep; (5) Does not have unusual mass concentrations along the wing span (such as floats or fuel tanks in the outer wing panels).
Modify	4.7 Ground and Water Control and Stability
Add	4.7.3 A seaplane or amphibian may not have dangerous or uncontrollable porpoising characteristics at any normal operating speed on the water.
Add	4.8 Spray characteristics — Spray may not dangerously obscure the vision of the pilots or damage the propeller or other parts of a seaplane or amphibian at any time during taxiing, take-off, and landing.
Add	5.10.2 Each aeroplane with retractable landing gear must be designed to protect each occupant in a landing: 5.10.2.1 With the wheels retracted;

	5.10.2.2 With moderate descent velocity; 5.10.2.3 Assuming, in the absence of a more rational analysis (1) a downward ultimate inertia force of 3g, and (2) a coefficient of friction of 0.5 at the ground.
Add	6.~~11~~ 12 Landing Gear Retracting Mechanism 6.~~11~~ 12.1 Each landing gear retracting mechanism and its supporting structure must be designed for the maximum flight load factors occurring with the gear retracted. 6.~~11~~ 12.2 For retractable landing gears it must be shown that extension and retraction of the landing gear are possible without difficulty up to VLO. 6.~~11~~ 12.3 An aeroplane equipped with a non-manually operated landing gear must have an auxiliary means of extending the gear. 6.~~11~~ 12.4 If a retractable landing gear is used, there must be a means to inform the pilot that the gear is secured for both the extended and retracted position.
Add	6.~~12~~ 13 Floats and Hulls 6.~~12~~ 13.1 Main Float Buoyancy — Each main float must have: 6.~~12~~ 13.1.1 A buoyancy of 1.8 times the portion of the 80 % in excess of the maximum weight which that float is expected to carry in supporting the maximum weight of the seaplane or amphibian in fresh water; and 6.~~12~~ 13.1.2 Enough watertight compartments to provide reasonable assurance that the seaplane or amphibian will stay afloat if any of the two compartments of the main floats are flooded. 6.~~12~~ 13.2 Each main float must contain at least four watertight compartments approximately equal in volume. 6.~~12~~ 13.3 Auxiliary Floats — Auxiliary floats must be arranged so that when completely submerged in fresh water, they provide a righting moment of at least 1.5 times the upsetting moment caused by the seaplane or amphibian being tilted.
~~Modify~~ Add	~~7.1 Installation~~ ~~7.1.1 The powerplant installation shall be easily accessible for inspection and maintenance.~~ ~~7.1.2 The powerplant attachment to the airframe is part of the structure and shall withstand the applicable load factors.~~ ~~7.1.3 Propeller-Engine-Airframe Interactions — In the absence of a more rigorous approach, powerplant installations must be shown to have satisfactory endurance in accordance with the requirements of 7.1.3.1 through 7.1.3.3 without failure, malfunction, excessive wear, or other anomalies.~~ ~~7.1.3.1 Complete 100 hours of flight operations for any approved propeller, engine, and engine mount combination. The testing must be completed on a single set of hardware, inclusive of engine, propeller, and engine mount.~~ ~~7.1.3.2 A modification to an existing installation that complies with 7.1.3.1 involving only a propeller or engine mount change shall complete 25 hours of flight operations. For the purposes of this requirement, propeller pitch changes to an otherwise approved installation are not considered to be a propeller change.~~ ~~7.1.3.3 Flight operations such as performance, controllability, manoeuvrebility, and structural flight testing may be counted toward the requirements of this section.~~ 7.1.4 The powerplant, including all systems required for the operation of the

	engine and including installed accessories, must be installed to ensure safe operation within the aircraft operating envelope. 7.1.5 Systems required for the operation of the engine must be identified and verified to provide adequate capacities (such as fuel flow, lubrication, cooling) within the aircraft operating envelope. 7.1.6 Areas of the engine compartment where flammable fluids or moisture could accumulate in normal ground and flight attitudes must be drained.
Add	7.4.3 Oil lines located in an area subject to high heat (engine compartment) must be fire resistant or protected with a fire-resistant covering.
Add	7.7 Cooling 7.7.1 Liquid cooling — When equipped with a liquid cooling system: 7.7.1.1 Components of the liquid cooling system must be selected and installed as to withstand all operating conditions that must be expected. 7.7.1.2 Coolant tanks shall be designed to withstand a positive pressure of 24.5 kPa (3.55 psi) (2.5-m (8.2-ft) water column) plus the maximum working pressure of the system.
Add	7.8 Exhaust — Each exhaust system must ensure safe disposal of exhaust gases without fire hazard or carbon monoxide contamination in the personnel compartment.
Add	7.9 Propeller: 7.9.1 Sufficient clearance must be provided between propeller and ground or water, as well as between propeller (including all other rotating parts of the propeller and spinner) and structural components. Effects of aircraft weight, center of gravity, propeller pitch positions, flight accelerations, vibrations and aging of shock mounts must be considered.
Add	8.6 Instruments and other equipment may not in themselves, or by their effect upon the aircraft, constitute a hazard to safe operation. Therefore: 8.6.1 Each item of required ATC equipment must be approved. 8.6.2 Each item of installed equipment must: 8.6.2.1 be installed according to limitations specified for that equipment; 8.6.2.2 be installed in a way that it is unlikely to adversely affect the proper functioning of any other system or equipment of the aircraft; 8.6.2.3 be installed in a way to function properly; 8.6.2.4 be labelled or designed to be clearly identifiable; 8.6.2.5 be described and labelled appropriately regarding limitations and operation.
Delete	9.1.4
Delete	9.2 incl. sub-chapters
Modify	10.1 Each aeroplane shall be furnished with a Flight Manual or Pilot's Operating Handbook (POH) that complies with Subpart G1.
~~Delete~~	~~Annex A1 incl. sub-chapters~~

Annex A1 Additional Requirements for Light Sport Airplanes used to tow gliders

Add	A1.2.4 The take-off distance according 4.4.2 must not exceed 500 m when taking off from dry, level, hard surface at sea level.
Add	A1.3.2 An adequate Stall Warning must be shown for the tow condition.
Modify	A1.6.1.4 (3) the pilot effort required shall not be less than 20 N ~~(4.5 lb)~~ nor greater than ~~100 N (22.5 lb)~~ 200 N.
Modify	A1.6.1.5 The release control shall be located so that the pilot can operate it without having to release any other primary flight control and should be of yellow/red colour.
Modify	A1.6.1.6 The rated ultimate strength of the weak links to be used in the towing cable shall be established and shown to be suitable in operation. For the determination of loads to be applied for the purpose of this section, the strength of the weak link shall not be less than 300 daN (674.4 lb).
Add	A1.6.1.8 For towing flights a device (e.g. an adjustable mirror) shall be used so that the pilot, when strapped in his seat, has full and unrestricted view of the towed glider in the positions of A1.6.1.3(2)
Modify	A1.7.1.1 The minimum permissible towing speed (V_{Tmin}, > 1.3*V_{S1}) and the maximum permissible towing speed ~~(V_t)~~(V_{Tmax} > 1.5*V_{S1} < V_A).
Add	A1.7.1.5 The minimum and maximum tow rope length and the tow rope flexibility.

Annex A2 Light Sport Aircraft to be flown at Night

Modify	Annex A2 External lights A2.1 Applicability A2.1.1 If external lights are installed they must comply with Annex A2 as amended by this CS-LSA.A2.7.2 to ~~A2.9.8.~~ A2.7.4.2 and A2.7.4.4.
Delete	Annex A2 Chapters A2.2 – A2.7.1.5 and Chapter A2.7.4.3 and Chapters A.2.8 – A.2.11.2

Subpart G — Operating Limitations and Information

CS-LSA.20 Flight Manual or Pilot's Operating Manual

The Flight Manual or Pilot's Operating Handbook (POH) shall comply with F2746-~~09~~12 as modified below or GAMA Specification No 1 Revision No 2 Issued February 15, 1975; revised October 18, 1996.[6]

(a) Each part of the Flight Manual containing information required by the following chapters or paragraphs of a Pilot's Operating Handbook according to F2746-~~09~~12:

- Chapter No 2 Limitations;
- Chapter No 3 Emergency Procedures;
- Chapter No 5 Performance;
- 6.10.1 Weight and Balance Chart;
- 6.10.2 Operating Weights and loading;
- 6.10.3 Center of Gravity (CG) range and determination;
- 6.12.5.1 Approved fuel grade and specifications;
- 6.12.5.2 Approved oil grades and specifications;

must be approved, segregated, identified and clearly distinguished from each other unapproved part of the Flight Manual.

b) Non-approved information must be presented in a manner acceptable to the Agency.

CS-LSA.25 Standard Specification for Pilot's Operating Handbook (POH):

If a Pilot's Operating Manual is provided to comply with CS-LSA.20, it shall comply with ASTM F2746-~~09~~12 including all Annexes and Appendices, except as modified by the following table.

Delete	1.3
Delete	1.4
Delete	~~3.2~~ 3.1.1
Delete	4.6
Modify	6.4.1 A list of the standards used for the design, construction, continued airworthiness, and reference compliance with this standard
~~Modify~~	~~6.6.4 Maneuvering speed (V_A)~~
Delete	6.13.3
Delete	7

[6] Available from the General Aviation Manufacturers Association, http://www.gama.aero/.

CS-LSA.30 Maintenance manual

(a) A maintenance manual containing the information that the applicant considers essential for proper maintenance must be provided.

(b) The part of the manual containing service life limitations, (replacement or overhaul) of parts, components and accessories subject to such limitations must be approved, identified and clearly distinguished from each other unapproved part of the Maintenance Manual.

(c) The Maintenance Manual shall comply with ASTM F2483-~~05~~12 including all Annexes and Appendices, except as modified by the following table.

Delete	1.2
Delete	3.1.2
Delete	3.1.6
Delete	3.1.7
Delete	3.1.7.1
Delete	3.1.8
Delete	3.1.14
Delete	3.1.15
Delete	3.1.16
Delete	4
Delete	Note 1
Modify	5.3 When listing the level of qualification needed to perform a task, the applicant shall use one of the following qualifications from the applicable regulations of Part-M and Part-66 for ELA1 aircraft maintenance: (1) Maintenance personnel of a Part-M, Section A Subpart F maintenance organisation; (2) Independent certifying staff qualified in accordance with Part-66; (3) Pilot/Owner qualified in accordance with M.A.803.
Delete	5.3.1 to 5.3.6
Modify	6.1 Authorisation to Perform — Part-M and Part-66 must be consulted for minimum authorisation to perform line maintenance, repairs and alterations of LSA aircraft.
Delete	Note 5
Modify	7.1 Authorisation to Perform — Part-M and Part-66 must be consulted for minimum authorisation to perform heavy maintenance, repairs and alterations of LSA aircraft.

Delete	Section 8 and all sub-chapters and notes.
Delete	Section 9 and all sub-chapters and notes.
Delete	Section 10 and all sub-chapters and notes.
Delete	Section 11 and all sub-chapters and notes.
Delete	Section 12 and all sub-chapters.
Delete	Annex A1 LSA Major repair and alteration (MRA) requirements

Subpart H — Engine and Electric Propulsion Units (EPU)

CS-LSA.35 Applicable Specifications for engines

Installed engines shall comply with ASTM F2339-06, ASTM F2538-07a, 14 CFR Part 33, CS-E or CS-22 Subpart H standards.

When selected, ASTM F2339-06 applies, including all Annexes and Appendices, except as modified by the following table:

delete	1.2
delete	2
delete	4 and all sub-chapters
delete	7 and all sub-chapters
delete	8

When selected, ASTM F2538-07a applies, including all Annexes and Appendices, except as modified by the following table:

delete	1.2
delete	3
delete	5 and all sub-chapters
delete	8 and all sub-chapters
delete	9

CS-LSA.37 Applicable Specifications for Electric Propulsion Units (EPU)

Installed EPU shall comply with ASTM F2840-11.

When selected, ASTM F2840-11 applies, including all Annexes and Appendices, except as modified by the following table:

delete	1.4
delete	8
delete	10

Subpart J — Propeller

CS-LSA.40 Applicable Specifications for propellers

Installed propellers shall comply with ASTM F2506-~~07~~10, 14 CFR Part 35, CS-P, or CS-22 Subpart J standards.

When selected, ASTM F2506-~~07~~10 applies, including all Annexes and Appendices, except as modified by the following table:

delete	1.4
~~delete~~	~~2 incl. sub-chapters~~
delete	10
Add	5.6 Pitch Control 5.6.1 Failure of the propeller pitch control may not cause hazardous overspeeding under intended operation conditions. 5.6.2 If the propeller can be feathered, the control system must be designed to minimize 1) consequential hazards, such as a propeller runaway resulting from malfunction or failure of the control system, and 2) the possibility of an unintentional operation.
Modify	6.5.1 After completion of each test prescribed in Section 6 of this specification, the propeller must be completely disassembled and a detailed inspection must be made of the propeller parts for cracks, wear, distortion, and any other unusual conditions.
Add	6.7 Function Test 6.7.1 Each variable pitch propeller must be subjected to all applicable functional tests of this paragraph. The same propeller used in the endurance test must be used in the functional test and must be driven by an engine on a test stand or on a powered sailplane. 6.7.2 Manually controllable propellers — 500 complete cycles of control throughout the pitch and rotational speed ranges, excluding the feathering range. 6.7.3 Automatically controlled propellers — 1 500 complete cycles of control throughout the pitch and rotational speed ranges, excluding the feathering range.

Subpart K — Airframe Emergency Parachute

CS-LSA.45 Applicable Specifications for airframe emergency parachutes

Installed Airframe Emergency Parachutes and installations of such systems shall comply with ASTM F2316-~~08~~12.

ASTM F2316-~~08~~12 applies, including all Annexes and Appendices, except as modified by the following table:

delete	1.~~3~~4
~~delete~~	~~2 incl. sub-chapters~~
~~delete~~	~~X1.1.1 including Note X1.1~~
~~delete~~	~~X1.2.1~~
~~delete~~	~~X1.3.1~~
~~Modify~~	~~Fig X1.1 shows the placard explained under 11.3.3.1~~
~~Modify~~	~~Fig X1.2 shows the placard explained under 11.3.3.2~~
~~Modify~~	~~Fig X1.3 shows the placard explained under 11.3.3.3~~
delete	12

EASA Certification Specifications

for

Light Sport Aeroplanes

CS-LSA
Book 2

Acceptable Means of Compliance

AMC Subpart A — General

AMC LSA.5 Applicability

This CS-LSA is applicable to aeroplanes that are by definition engine-driven by design and therefore this CS-LSA is not applicable to powered sailplanes that are designed for sailplane characteristics when the engine is inoperative.

AMC Subpart B — Standard Specification for Design and Performance of a Light Sport Aeroplane

AMC to ASTM F2245 ~~-10c~~12d Sub-chapter 6.2 Materials

Parts of Structure Critical to Safety

(a) 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:

Material used	Allowable normal stress level of maximum limit load
– Glass rovings in epoxy resin	25 daN/mm^2
– Carbon fibre rovings in epoxy resin	40 daN/mm^2
– Wood	According to ANC-18*
– Aluminium Alloy	Half of rupture tensile strength
– Steel Alloy	Half of rupture tensile strength

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

(1) By a fatigue test, based on a realistic operating spectrum.

(2) 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).

Material Strength Properties and Design Values (Interpretative material)

Material specifications should be those contained in documents accepted either specifically by the Agency or by having been prepared by an organisation or person that the Agency accepts has the necessary capabilities. In defining design properties these material specification values should be modified and/or extended as necessary by the constructor to take account of manufacturing practices (for example method of construction, forming, machining and subsequent heat treatment).

AMC to ASTM F2245-12d Annex A1.1 Applicability

Multi glider tows (more than one glider at the same time) and banner towing is not covered by Annex 1.

AMC to ASTM F2245-12d Annex A1.7 Operating Limitations

Tests according A1.2 - A1.4 with at least 3 different glider types representing critical combinations of maximum and minimum weight, aerodynamic characteristics, maximum and minimum speeds, ground handling, and environmental conditions could be regarded acceptable to cover the representative fleet of all kind of requested gliders.