



Advisory Circular

AC 21-42(1)

FEBRUARY 2006

LIGHT SPORT AIRCRAFT MANUFACTURER'S REQUIREMENTS

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1. REFERENCES

This Advisory Circular (AC) should be read in conjunction with:

- Civil Aviation Safety Regulations (CASR) Subpart 21.H
- Civil Aviation Safety Regulations (CASR) Dictionary
- AC 21-41(0) – Light Sport Aircraft Certificate of Airworthiness
- AC 21.10(0) – Experimental Certificates

2. PURPOSE

This AC explains the certification requirements for a Light Sport Aircraft manufacturer.

3. STATUS OF THIS AC

This AC has been amended to include additional standards that were not previously available for weight shift and gyroplanes and existing standards ATSM designations have been amended to the current approval status.

Advisory Circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.

Where an AC is referred to in a 'Note' below the regulation, the AC remains as guidance material.

ACs should always be read in conjunction with the referenced regulations

4. BACKGROUND

4.1 CASA has introduced new standards for the manufacture, certification, operation, and maintenance of light sport aircraft. The standards have been implemented as a result of other National Airworthiness Authorities (NAA's) adopting similar standards to address advances in sport and recreational aviation technology. The intended effect of the rules covering these standards is to allow the manufacture of safe and economical aircraft, to be operated for the purpose of sport and recreation, to carry a passenger, and to conduct flight training and glider towing.

5. WHAT IS A LIGHT SPORT AIRCRAFT?

5.1 A light sport aircraft (LSA) is a small, simple to operate, low performance aircraft. With regard to the requirements of the CASRs, a light-sport aircraft is an aircraft, other than a helicopter that complies with the following criteria:

- (1) A maximum takeoff weight of not more than 600 kilograms or 650 kilograms for an aircraft intended for operation on water or 560 kilograms for a lighter-than-air aircraft.
- (2) A maximum stalling speed in the landing configuration (V_{SO}) of not more than 45 knots CAS at the aircraft's maximum certificated takeoff weight and most critical center of gravity.
- (3) A maximum seating capacity of no more than two persons, including the pilot.
- (4) If powered, a single, non-turbine engine fitted with a propeller.
- (5) A non-pressurised cabin:
 - (i) For an aircraft operating over land, a fixed landing gear;
 - (ii) For an aircraft intended for operation on water, a fixed or repositionable landing gear; and
 - (iii) For a glider a fixed or retractable landing gear.
- (6) If the aircraft is a glider a maximum never exceed speed V_{ne} of 135 knots CAS.

The types of aircraft that may satisfy these criteria are:

- (a) Fixed wing aircraft;
- (b) Powered parachutes;
- (c) Weight shift aircraft;
- (d) Gliders;
- (e) Balloons;
- (f) Airships; and
- (g) Gyroplanes.

6. MANUFACTURING LIGHT SPORT AIRCRAFT

6.1 The certification and continuing airworthiness of LSA is the responsibility of the manufacturer. The manufacturer is to ensure that LSA are designed and manufactured to suitable standards. As well as this, the manufacturer is also responsible for ensuring the continuing airworthiness of each aircraft.

6.2 Manufacturer's Qualifications

6.2.1 Manufacturers need to demonstrate they are suitably qualified to manufacture a LSA. (Refer to CASR 21.172) To satisfy this, a manufacturer should either:

- (1) Hold a current production certificate. (It is expected that the manufacturer will hold a production certificate for a similar aircraft type to the manufactured LSA); or
- (2) If the manufacturer does not hold a production certificate, the manufacturer should make a declaration in writing indicating it has:
 - (i) contracted engineering personnel with experience in ultralight or light aircraft design to ensure compliance with LSA standards; and
 - (ii) facilities and tools suitable for the production of the aircraft in accordance with the applicable LSA standards; and
 - (iii) competent personnel, with appropriate training, skills and experience, to perform work that affects product quality.

6.3 Overseas Manufacturers

6.3.1 For LSA to be certified and operated in Australia, overseas LSA manufacturers are required to be from a Contracting State. To ensure compliance with the Australian LSA Standards, overseas manufacturers will be required to show evidence that they meet similar requirements to local manufacturers.

Note: An overseas manufacturer who holds a production approval (however described) for a similar type of aircraft issued by their National Airworthiness Authority (NAA) or approved organisation delegated by their NAA, would satisfy these requirements.

6.4 LSA Standards

6.4.1 Appendix 1 to this AC lists the LSA standards required to show compliance with each category of LSA. These include the American Society for Testing and Materials (ASTM) standards and alternative standards that CASA has deemed as acceptable for this type of aircraft. Although there is a range of different design standards it is not acceptable to "cherry pick" selected paragraphs out of these standards when signing a statement of compliance. If the manufacturer selects a design standard for their aircraft then compliance should be shown with the entire standard.

Note: The manufacturer must be aware that the USA FAA accept the ASTM standards only for aircraft operating in the USA.

6.5 LSA Statement of Compliance

6.5.1 For a production LSA to be issued a Special Certificate of Airworthiness, the manufacturer is required to sign a Statement of Compliance (see example at Appendix 2 to this AC) for each aircraft that is produced. This Statement of Compliance indicates the aircraft complies with all the applicable LSA standards for the aircraft type. (See Appendix 1 to this AC).

6.6 Exporting LSA aircraft overseas

6.6.1 It should be noted that other NAAs may have different requirements for LSA. For instance, the FAA definition for LSA has a number of differences that should be taken into consideration before aircraft will be accepted in the USA. For example, the FAA has a different stall speed (V_{SO}), never exceed speed (V_{NE}) and only accepts the ASTM standards. Therefore, prior to designing and manufacturing aircraft for the overseas market, it is crucial that the manufacturer considers the applicable NAA requirements for LSA certification and operation in that particular country.

6.7 Manufacturing production aircraft

6.7.1 To produce a LSA, the manufacturer needs to consider the design, the quality assurance of the product and the continuing airworthiness requirements. These requirements are all contained in the standards listed in Appendix 1 to this AC. For a particular market, a manufacturer should decide on the most applicable design standard prior to manufacturing the aircraft. The proposed market will influence the choice of standard. For example, if the manufacturer wants to export its aircraft to the USA then the only apparent choice is to ensure the aircraft complies only with the ASTM standards and meets the FAA LSA definition in FAR Part 1. Note the ASTM standards can be purchased online at <http://www.astm.org>.

6.7.2 A manufacturer does not require a CASA production certificate to manufacture a LSA. However, the manufacturer needs to be suitably qualified (see paragraph 6.2) and should comply with the quality assurance and production test acceptance standards as listed in Appendix 1 to this AC.

6.7.3 As CASA will not be responsible for the continuing airworthiness of these aircraft, the manufacturer will be required to continually monitor the airworthiness of these aircraft in accordance with the LSA Continued Operational Safety Monitoring standard. This will require the manufacturer to manage a database of all owners of aircraft in Australia and overseas, investigate service defects and address safety critical defects with corrective action in the form of a safety directives issued to all affected owners/registered operators.

6.7.4 The manufacturer will also need to provide product information in accordance with the LSA standards. This will include the data plate, conformity details of the aircraft, warning decals, aircraft operating instructions, the aircraft flight training supplement and the maintenance and inspection procedures.

6.7.5 If the manufacturer decides to include a type certificated product such as an engine or propeller in its aircraft, then these components are still subject to the requirements of the CASRs. For instance, the data plate of a type-certificated product such as an engine or propeller should be in accordance with CASR 21.820. Also an airworthiness directive (AD) applicable to an aeronautical product is required to be complied with in accordance with the requirements of the AD. This may include type certificated engines or propellers or other products such as transponders, flight instruments, and radio and communication equipment.

6.7.6 Upon completion of manufacturing the aircraft, the manufacturer is required to sign a Statement of Compliance (see example at Appendix 2 to this AC) indicating the aircraft conforms with the identified LSA standards contained in Appendix 1 to this AC. Also the manufacturer is required to provide copies of the aircraft operating instructions, the aircraft maintenance and inspection procedures and the aircraft flight training supplement. If the manufacturer resides/operates overseas, the manufacturer will need to provide evidence that the aircraft is manufactured in a Contracting State, and the aircraft is eligible for a certificate of airworthiness, or another document of similar effect, in the country of manufacture. (Refer to CASR 21.186 (2) (d)).

6.8 Manufacturing kit built LSA

6.8.1 An LSA kit is not required to follow the 51 percent rule as required for other experimental kit aircraft. However, before a kit built LSA can be accepted for an experimental certificate, the manufacturer will need to produce a production aircraft issued with a Special Certificate of Airworthiness in the LSA category of the same make and model. (Refer to CASR 21.191(j)(iii)).

Note: To indicate that the aircraft is kit built, the model number may have a different prefix or suffix to the production aircraft model number.

6.8.2 A kit built LSA is manufactured to the same applicable LSA standards as the production aircraft of the same make and model except the standards relating to production testing are not required. Instead of complying with the production aircraft test standards, the manufacturer needs to identify the assembly instructions for the aircraft meeting the applicable LSA standard for kit assembly.

6.8.3 For the kit built aircraft to be eligible for an experimental certificate, satisfactory evidence needs to be presented to show that the aircraft was manufactured and assembled to the applicable LSA standards. Therefore, the manufacturer will need to provide to the owner of the aircraft a Statement of Compliance indicating that the aircraft kit complies with the applicable LSA standards for a kit aircraft. (Note that the standard for production testing is not required). The manufacturer will also need to provide information that shows a Special Certificate of Airworthiness has been issued for a production aircraft of the same make and model. The manufacturer will also need to provide aircraft assembly instructions, operating instructions, aircraft maintenance and inspection procedures and an aircraft flight training supplement.

6.8.4 The manufacturer is not responsible for the assembly and acceptance testing of a kit built aircraft. This responsibility lies with the owner.

7. CONTINUED OPERATIONAL SAFETY MONITORING OF LIGHT SPORT AIRCRAFT

7.1 The manufacturer is required to have a system to monitor and correct safety of flight issues in accordance with the ASTM standard for Continued Operational Safety Monitoring of Light Sport Aircraft. Refer to CASR 21.186(2)(e). The manufacturer would be responsible for monitoring and notifying operators to correct unsafe conditions in aircraft for as long as the aircraft are registered in Australia. This requires the manufacturer to evaluate all significant defects and correct any unsafe condition that may exist in the remaining fleet. To achieve this, the manufacturer should provide a method for the operator of the aircraft to report any in-service difficulty.

7.2 Safety Directions

7.2.1 The manufacturer may decide that a Safety Direction (SD) is required to correct an unsafe condition. In such a circumstance, the manufacturer should issue a notice to all the known registered operators of the affected aircraft. It is therefore very important and is a requirement with the LSA standard that the manufacturer has the current contact information of all owners/registered operators of their aircraft in Australia and overseas. It is recommended, the manufacturer include a statement in the relevant documents that when the aircraft changes ownership, the manufacturer is notified of the new owner's (registered operator's) name and address.

7.2.2 When a registered operator receives a Safety Direction (SD), the operating rules require the operator to comply with the requirements of the directive. The operator may apply to the manufacturer for a variation or exemption against the SD provided suitable safety justification is included in the application. The manufacturer is to assess the application and if the safety justification satisfactorily addresses the safety issue, the manufacturer may approve an alternative means of compliance against the SD. However, if the manufacturer does not approve an application, the registered operator must comply with the requirements of the manufacturer's SD. Failure to comply with a SD is considered a serious breach of the regulations and would result in regulatory action against the registered operator.

7.3 Modifications

7.3.1 For production LSA aircraft issued with a Special Certificate of Airworthiness, the manufacturer is responsible for approving all modifications. All modifications should be produced in accordance with the LSA standards applicable to the aircraft. Therefore, it is important to note that modifications issued by a person authorised under CAR 35 or an engineer authorised under CASR Part 146 (not introduced yet) still need approval from the manufacturer. Modifications that are not approved by the manufacturer will result in the revoking of the Special Certificate of Airworthiness. (refer to CASR 21.181(4)(b)).

8. PLACARDS AND WARNINGS

8.1 For production LSA aircraft, an information placard is required to be displayed in the cabin or cockpit at a location in full view of the passenger and the pilot (Refer to CAR 262APA (1)(f)), with the wording:

THIS AIRCRAFT WAS MANUFACTURED
IN ACCORDANCE WITH THE LIGHT SPORT AIRCRAFT AIRWORTHINESS
STANDARDS AND DOES NOT CONFORM TO STANDARD CATEGORY
AIRWORTHINESS REQUIREMENTS.

9. WHAT HAPPENS IF A MANUFACTURER NO LONGER EXISTS

9.1 In the event that a manufacturer no longer exists or can no longer provide continuing airworthiness (CAW) support to registered operators of their aircraft, a competent person may be appointed by CASA to carry out the CAW support. If no-one satisfies the CASA approval criteria or no person applies to CASA for appointment, the existing LSA can no longer operate under a Special Certificate of Airworthiness. In such situation these aircraft can continue to be operated under an experimental certificate for LSA

9.2 For CASA to appoint a competent person to carry out the CAW function of the manufacturer, a person should have:

- (1) a system to monitor and correct safety of flight issues in accordance with the ASTM standard for Continued Operational Safety Monitoring of Light Sport Aircraft; and
 - (2) access to existing manufacturer's data of aircraft configuration and registered operators of the aircraft; and
 - (3) contracted engineering personnel with experience in ultralight or light aircraft design and repair to ensure compliance with the LSA standards; and
 - (4) facilities, tools and trained or appropriately experienced staff suitable for providing the CAW for these aircraft; and
 - (5) an audit system (internal or external) that complies with the LSA quality standards.
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APPENDIX 1

LIGHT SPORT AIRCRAFT (LSA) STANDARDS

1. GENERAL

This Appendix to AC 21-42 lists the LSA standards as defined in CASR 21.172.

The LSA standards for a particular class of LSA are the ASTM standards (see paragraph 2) or alternative standards (see paragraph 3).

2. ASTM STANDARDS

2.1 The following table sets out the ASTM standard for each subject and class of LSA:

| SUBJECT | CLASS OF LSA | | | | | |
|---------------------------------------|--------------|-------------------|------------|----------------------|--------------------|----------------------|
| | Fixed Wing | Gliders | Gyroplanes | Lighter - Than - Air | Powered Parachutes | Weight Shift Control |
| Design and Performance | F2245-04 | Not yet available | F2352 -05 | F2355-05 or -05a | F2244-05 | F2317/F2317M-05 |
| Required Equipment | F2245-04 | Not yet available | F2352-05 | F2427-05 or -05a | F2243-05 | F2457-05 |
| Quality Assurance | F2279-03 | Not yet available | F2449-05 | F2353-04 or -05 | F2240-05 | F2448-04 |
| Production Acceptance Tests | F2279-03 | Not yet available | F2449-05 | F2356-05 or -05a | F2242-05 | F2247-05 |
| Aircraft Operating Instructions | F2245-04 | Not yet available | F2352-05 | F2427-05 or -05a | F2243-05 | F2457-05 |
| Continued Airworthiness | F2295-03 | Not yet available | F2415-05 | F2354-05 or -05b | F2241-05 or -05a | F2425-05 or -05a |
| Maintenance and Inspection Procedures | F2483-05 | F2483-05 | F2483-05 | F2483-05 | F2483-05 | F2483-05 |
| Wing Interface | N/A | N/A | N/A | N/A | F2426-05 | N/A |

2.2 The ASTM standards for Fixed Wing Aircraft are:

ASTM Standard F2245-04 - Standard Specification for the Design and Performance of a Light Sport Aircraft.

ASTM Standard F2279-03 - Standard Practice for Quality Assurance in the Manufacture of Light Sport Aircraft.

ASTM Standard F2295-03 - Standard Practice for the Continued Operational Safety Monitoring of a Light Sport Aircraft.

ASTM Standard F2483-05 - Standard Practice for Maintenance and the Development of Maintenance Manuals for Light Sport Aircraft.

2.3 The ASTM standards for Gliders are:

(Not yet available)

ASTM Standard F2483-05 - Standard Practice for Maintenance and the Development of Maintenance Manuals for Light Sport Aircraft.

2.4 The ASTM standards for Gyroplanes are:

ASTM Standard F2352-05 - Standard Specification for Design and Performance of Light Sport Gyroplane Aircraft

ASTM Standard F2449-05 – Standard Specification for Manufacturer Quality Assurance Program for Light Sport Gyroplane Aircraft.

ASTM Standard F2415-05 - Standard Practice for Continued Airworthiness System for Light Sport Gyroplane Aircraft

ASTM Standard F2483-05 - Standard Practice for Maintenance and the Development of Maintenance Manuals for Light Sport Aircraft.

2.5 The ASTM standards for Lighter-than-Air are:

ASTM Standard F2355-05 or -05a - Standard Specification for Design and Performance Requirements for Lighter-Than-Air Light Sport Aircraft

ASTM Standard F2353-04 or -05 - Standard Specification for Manufacturer Quality Assurance Program for Lighter –Than-Air Light Sport Aircraft.

ASTM Standard F2356-05 or -05a - Standard Specification for Production Acceptance Testing System for Lighter-Than-Air Light Sport Aircraft.

ASTM Standard F2354-05 or -05b - Standard Specification for Continued Airworthiness System for Lighter than Air Light Sport Aircraft.

ASTM Standard F2427-05 or -05a - Standard Specification for Required Product Information to be Provided for Lighter-Than-Air Light Sport Aircraft.

ASTM Standard F2483-05 - Standard Practice for Maintenance and the Development of Maintenance Manuals for Light Sport Aircraft.

2.6 The ASTM standards for Powered Parachutes are:

ASTM Standard F2244-05 - Standard Specification for the Design and Performance of Powered Parachute Aircraft.

ASTM Standard F2243-05 – Standard Specification for Required Product Information to be Provided with Powered Parachute Aircraft.

ASTM Standard F2240-05 - Standard Specification for a Manufacturer Quality Assurance Program for Powered Parachute Aircraft.

ASTM Standard F2242-05 - Standard Specification for a Product Acceptance Testing System for Powered Parachute Aircraft.

ASTM Standard F2241-05 or -05a - Standard Specification for a Continued Airworthiness System for Powered Parachute Aircraft.

ASTM Standard F2426-05 - Standard Guide on Wing Interface Documentation for Powered Parachute Aircraft

ASTM Standard F2483-05 - Standard Practice for Maintenance and the Development of Maintenance Manuals for Light Sport Aircraft.

2.7 The ASTM standards for Weight-Shift-Control Aircraft are:

ASTM Standard F2317/F2317M-05 – Standard Specification for Design of Weight-Shift-Control Aircraft

ASTM Standard F2457-05 - Standard Specification for Required Product Information to be Provided with Weight-Shift-Control Aircraft.

ASTM Standard F2448-04 - Standard Practice for Manufacturer Quality Assurance System for Weight-Shift-Control Aircraft.

ASTM Standard F2247-05 - Standard Specification for a Production Acceptance Testing System for Weight-Shift-Control Aircraft.

ASTM Standard F2425-05 or -05a – Standard Specification for Continued Airworthiness System for Weight-Shift-Control Aircraft

ASTM Standard F2483-05 - Standard Practice for Maintenance and the Development of Maintenance Manuals for Light Sport Aircraft.

2.8 The ASTM standards for “cross-cutting” issues are:**2.8.1 Engines**

ASTM Standard F2339-04 or -05 Standard Practice for the Design and Manufacture of Reciprocating Spark Ignition Engines for Light Sport Aircraft.

2.8.2 Propeller

(Not yet available)

2.8.3 Emergency Parachutes

ASTM Standard F2316 - 03 – Standard Specification for Airframe Emergency Parachutes for Light Sport Aircraft.

3. ALTERNATIVE LSA STANDARDS ACCEPTABLE TO CASA

3.1 Fixed Wing Aircraft

Alternative Standards for **Design and Performance** (ASTM Standard F2245) are:

- (1) BCAR Section S (Britain);
- (2) CS VLA (EASA);
- (3) CAO 101.55 (Australia);
- (4) DaeC (BFU) 10/95 (Germany);
- (5) UL/2 PT2 (Czech Republic);
- (6) PICA 26 (Australia); and
- (7) DS 10141E (Canada).

3.2 Gliders

(Nil at this time)

3.3 Gyroplanes

Alternative Standards for **Design and Performance** (ASTM Standard F2352 -04) are:

- (1) BCAR Section T (Britain);
- (2) ASRA Gyroplane Spec (Australia)

3.4 Lighter than Air Aircraft

Alternative Standards for **Design and Performance** (ASTM Standard F 2355-05) are:

- (1) BCAR Part 31 – balloons (Britain);
- (2) FAR Part 31 – balloons (USA);
- (3) CAO 101.54 (Australia);
- (4) BCAR Q – airships (Britain); and
- (5) FAA AC-21-17-1 – airships (USA).

3.5 Powered Parachute Aircraft

Alternative Standards for **Design and Performance** (ASTM standard F2244) are:

- (1) BCAR Section S (Britain); and
- (2) DS 10141E (Canada).

3.6 Weight Shift Control Aircraft

Alternative standards for **Design and Performance** (Not yet available as an ASTM Standard) are:

- (1) BCAR Section S (Britain);
- (2) DS 10141E (Canada)

4. WHERE TO ACCESS LSA STANDARDS

4.1 The standards issued by the American Society for Testing and Materials (ASTM) may be found at: www.astm.org

4.2 The standards issued by CASA (CAO 101.54, CAO 101.55) may be found at: <http://www.casa.gov.au/rules/orders/101.htm>

4.3 The standards issued by CASA (Pica 26) may be found at:

http://rrp.casa.gov.au/casr/026_pica26_v1-oct99.pdf

4.4 The standards issue by the USA FAA (FAR Part 31) may be found at: www.faa.gov/regulations_policies/faa_regulations/

4.5 The following standards issued by CAA UK may be found at:

BCAR Section S

<http://www.caa.co.uk/docs/33/CAP482.PDF>

BCAR Section T

<http://www.caa.co.uk/docs/33/CAP643.PDF>

BCAR Section Q

<http://www.caa.co.uk/docs/33/CAP471.pdf>

BCAR Part 31

<http://www.caa.co.uk/docs/33/CAP494.PDF>

4.6 The standard issued by ASRA (Gyroplane Specification) may be found at:

<http://www.asra.org.au/documents/TwoPlace%20Type%20Requirements.pdf>

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