

NAM-CATS 24

Airworthiness Standards: Non-Type Certificated Aircraft

INTRODUCTORY NOTES

1. GENERAL

- 1.1 *Section 227 of the Civil Aviation Act, 2016 empowers the Executive Director of Civil Aviation to issue technical standard for civil aviation. Section 227 of the Civil Aviation Act, 2016 further empowers the Executive Director of Civil Aviation to incorporate into a technical standard any international aviation standard or any amendment without publishing the text of such standard or any amendment by mere reference to the title, number and year of issue of such standard or amendment or to any other particulars by which such standard or amendment is sufficiently identified.*
- 1.2 *The Executive Director of Civil Aviation has, pursuant to the empowerment mentioned above, issued technical standards relating to Regulation Part 24 (Standards Relating to Non Type Certificated Aircraft) to be known as Document NAM-CATS-24.*
- 1.3 *Document NAM-CATS-24 comprises the standards, rules, requirements, methods, specifications, characteristics and procedures which are applicable in respect of Standards Relating to Non Type Certificated Aircraft.*
- 1.4 *Where there is any perceived disparity of meaning or inconsistency between these technical standards and the regulations, the provisions of the regulations will take precedence.*
- 1.5 *Where there is a difference between a standard or procedure prescribed in ICAO documents and the Civil Aviation Technical Standards (CATS), the CATS standard will prevail.*

- 1.6 *The abbreviation CAR is used throughout this document when referring to any civil aviation regulation.*
- 1.7 *The abbreviation TS is used throughout this document when referring to any technical standard.*
- 1.8 *In this document the words “Executive Director” refers to the chief executive officer of the Authority appointed pursuant to section 34 of the Civil Aviation Act 2016 being the Executive Director of Civil Aviation.*

2. AMENDMENTS TO THE TECHNICAL STANDARDS

- 2.1 *The NCAA Airworthiness Division has responsibility for the technical content of this technical standard.*
- 2.2 *This technical standard is issued, and may only be amended, under the authority of the Executive Director of Civil Aviation.*
- 2.3 *Requests for changes to the content of this technical standard must be forwarded to the Executive Director and may come from:*
 - (a) technical areas within NCAA; or*
 - (b) aviation industry service providers or operators; or*
 - (c) pilots, engineers and maintenance organization staff.*
- 2.4 *The need to change the content of this technical standard may arise for any of the following reasons:*
 - (a) to ensure safety;*
 - (b) to ensure standardisation;*
 - (c) to respond to changed NCAA regulations or standards;*
 - (d) to respond to changes initiated by ICAO;*
 - (e) to accommodate proposed initiatives or new technologies.*
- 2.5 *The NCAA may approve trials of new procedures or technologies to develop appropriate standards.*

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Form FSS-AIR-FORM076E Annual Inspection Form

24.01.2 AIRWORTHINESS

24.01.2(4) Applications for build number

An application for a build number must be made on Form FSS-AIR-FORM074/12, . See Annex D.

1. AMATEUR-BUILT AIRCRAFT

[Note: The following is applicable to all first designs, which include the prototype of a production-built aircraft (as defined). Where in respect of other categories of aircraft it is prescribed that they must meet the design standards of amateur- or production-built aircraft, the requirement is that, at one stage or another, these standards were met, and that such can be proven by means of documentation.]

The above is of importance especially in respect of the requirements for static testing. E.g.: only the prototype of a production-built aircraft needs to be static tested to ultimate loads. Other first designs need to be tested to limit loads only.

Similarly and unless otherwise stated, proving flights are required for first designs, including the prototype of a production-built aircraft, only. However, a proving test flight for the issue of an authority to fly is always required in respect of each and every individual aircraft.

Attention is also drawn to the fact that as soon as a constructor deviates from an approved build standard the aircraft type approval becomes invalid. Permission for the deviation (modification) needs to be obtained, and (new) proving flights may be required.]

1.1 Engineering design analysis

Regulation 24.01.2(5)(a) refers –

- (1) The owner of an amateur-built aircraft must ensure that proof of engineering design analysis for the aircraft or type of aircraft is available, validated and traceable.
- (2) The engineering design analysis for an amateur-built aircraft must include the following:
 - (a) the design criteria basis;
 - (b) a schedule of how compliance with the design criteria basis is proposed;
 - (c) a predicted performance analysis prior to commencing of proving flights;
 - (d) an aerodynamic analysis appropriate to the type of aircraft, in accordance with the checklist attached as Annex A;
 - (e) a structural analysis appropriate to the type of aircraft; and
 - (f) an analysis of the power plant/s and propeller/s (if applicable) and of the systems appropriate to the type of aircraft.

1.2 Design criteria

In the design of an amateur-built aircraft, the following conditions must be met:

- (1) The aircraft must be able to withstand the maximum loads to be expected in service without any permanent deformation or any deformation which

may interfere with the safe operation of the aircraft. See Section 1.7 “Static tests”.

- (2) The aircraft structure must be designed to be able to withstand ultimate loads; that is the limit loads multiplied with a safety factor as specified in the relevant subgroup.
- (3) The aircraft must not have any apparent unsatisfactory features of design and construction.
- (4)
 - (a) It is desirable, but not prescribed, that the constructor makes use of approved aircraft components, such as engines, propellers, wheels, instruments, avionics, electrical components and similar items. Structural components of other aircraft that are still airworthy may also be used.
 - (b) Where items, including materials, not normally approved for aircraft construction are to be used, the constructor must prove to the Executive Director or, if applicable, to the organisation approved for the purpose in terms of Part 149, as the case may be, that the item, items or materials have characteristics which make them suitable in all respects for the intended purpose and meet the design criteria referred to in Section 1.1(2)(a).
 - (c) The items, referred to in subparagraph (b) above, include engines and propellers, provided that no adverse characteristics of the engine, propeller, or engine-propeller combination are evident.
- (5) The constructor remains fully responsible for the integrity of the aircraft. Any inspections made by an inspector, to determine that such aircraft has been built from acceptable materials and in accordance with normal aircraft construction procedures, are carried out on the basis of the information given by the constructor to the inspector, and by careful study of the relevant drawings.
- (6) Where applicable, suitable means must be provided to minimize the possibility of carburettor icing.
- (7) The complete power plant installation, including the propeller, as installed in the aircraft, must undergo a test sequence as determined in the design criteria referred to in Section 1.1(2)(a).
- (8) Only fuel of a grade that will not cause destructive detonation and will minimize the possibility of vapour locks must be used.

[Note: Airworthiness standards that are acceptable to the Executive Director include –

- (a) BCAR Section K ‘Light Aircraft’***
- (b) FAR 23 ‘Light Aircraft’***
- (c) JAR-VLA ‘Very Light Aircraft’***
- (d) AFNOR – The French ACPULS certification***
- (e) DHV – The German ‘Gute Siegel’ certification***
- (f) USHGA – The US Hang Gliding Association***
- (g) AHGF – The Australian Hang Gliding Federation***
- (h) SHV – The Swiss Hang Verein certification***
- (i) SAPA – The South African Parachute Association reserve parachute testing procedure***
- (j) DULV.]***

1.3 Construction

- (1)** The materials used in the construction of the aircraft must be those normally accepted for aircraft use or their equivalents. If other materials are used, the constructor must be satisfied that they are in all respect satisfactory for the intended purpose. If called upon to do so, he or she must supply information to the Executive Director or, if applicable, the organization designated for the purpose in terms of Part 149 of the CAR as the case may be, on the qualities of the materials used. When wood (preferably spruce) is used, careful selection of quality is essential. Particular attention must be paid to the direction of the grain.
- (2)** The workmanship used in the construction of the aircraft must be of the highest standard. Constructors must use recognised aeronautical workshop practices. Document FAA AC 43-13 may be used for guidance.
- (3)** All welding must be done by the holder of a Category X 5 welding rating, issued in terms of Part 66 or Part 145 of the CAR. The welder’s particulars must be noted in the aircraft logbook.
- (4)** The builder or owner of the aircraft must keep, during the construction process, full recorded details of the process, the materials used, and the

dimensions of the parts and components. This is called the build standard of the aircraft.

1.4 Inspections

- (1) An owner, not conversant with the technical requirements concerning the construction of the aircraft, must have his or her aircraft inspected at various stages of construction by an Approved Person (AP), with the appropriate inspection rating for the type of aircraft, in order to prevent at an early stage the possibility of undesirable features.
- (2) At all times, before the covering of any major component, including the closure of wooden box spars, the structure must be made available for inspection by an AP, with the appropriate inspection rating for the type of aircraft, who is responsible for the completion of paragraph 8 of Form, and make the appropriate entry in the airframe logbook of the aircraft.
- (3) When completely assembled, with engine, essential instruments and equipment in place, the aircraft must again be made available for inspection by an AP, with the appropriate inspection rating for the type of aircraft, who is responsible for the completion of paragraph 10 of Form, and make an appropriate entry in the aircraft logbook certifying the work or inspection carried out.

[Note: The inspections referred to in subparagraphs (2) and (3) are required in order to establish that –

- (a) workmanship during construction and assembly of components conforms to good aeronautical practices and procedures;***
- (b) the materials used in the primary structure, the control systems, and in any other stressed parts are, in all respects, suitable for the intended purpose; and***
- (c) the construction is, in all respects, essentially similar to that of the latest issue of the drawings or altered drawings and build standard.]***

1.5 Determining the mass and centre of gravity of the aircraft

- (1) The empty mass of the aircraft (including the mass of equipment and instruments necessary for the safe operation of the aircraft) and its centre of gravity must be determined in accordance with Manual AC-43-13-1B and recorded on Form FSS-AIR-FORM076A/12 to be signed by the owner, before any proving flight authorization will be issued by the Executive

Director or, if applicable, the organization designated for the purpose in terms of Part 149 of the 2001 CAR as amended.

- (2) In the case of a weight-shift controlled aircraft, the applicant must provide the centre of gravity and the height difference or angle between the front wheel and the main gear.

[Note: Determining the line of centre of gravity for a weight-shift controlled aircraft is usually done by hanging the aircraft, using the attachment point between wing and the rest of the fuselage.]

1.6 Instruments, equipment and placards

- (1) Instruments

An amateur-built aircraft must be equipped with the instruments prescribed in Part 91, Part 94 and Part 96, as applicable for the operation of the particular type of aircraft, unless exempted in terms of this Part.

- (2) Equipment

An amateur-built aircraft must be equipped as prescribed in Part 91, Part 94 and Part 96, as applicable for the operation of the particular type of aircraft, unless exempted in terms of this Part.

- (3) Placards

The following placards must be installed in an amateur-built aircraft, unless exempted in terms of this Part:

- (a) In a prominent position in full view of the pilot and all passengers, and in capital letters of not less than 3 mm high:

WARNING

AMATEUR-BUILT AIRCRAFT

**THIS AIRCRAFT IS NOT REQUIRED TO COMPLY WITH ALL THE
REGULATIONS FOR TYPE-CERTIFICATED AIRCRAFT**

TO BE OPERATED FOR SPORT OR RECREATIONAL PURPOSES ONLY

YOU FLY IN THIS AIRCRAFT AT YOUR OWN RISK

(or the relevant other reference for the class or sub-group of the particular non-type certificated aircraft, such as "PRODUCTION-BUILT AIRCRAFT",

“MICROLIGHT AIRCRAFT”, “VETERAN AIRCRAFT”, “EX-MILITARY AIRCRAFT”):

Provided that the note “to be operated for sport or recreational purposes only” may be left off if the aircraft has been approved for commercial air transport operations in terms of Part 96;

(b) on the instrument panel(s):

OPERATE UNDER VMC ONLY

MAXIMUM PERMISSIBLE AIRSPEED	kts IAS
MAXIMUM PERMISSIBLE ENGINE SPEED	rpm
MAXIMUM PERMISSIBLE MASS	kg

Any additional limitation indication such as temperature, pressure, which the Executive Director or, if applicable, the organization designated for the purpose in terms of Part 149 of the CAR as the case may be, deems necessary:

Provided that the note “Operate under VMC only” may be left off if the aircraft has been approved for instrument flight;

(c) a fire-proof plate on the instrument panel, containing the following information:

- (i) Name of the constructor or manufacturer;
- (ii) Aircraft type and model;
- (iii) Aircraft registration letters and serial or build number;
- (iv) Engine make and model and horse power;
- (v) Date of manufacture.

(4) Exemptions

The following non-type certificated aircraft are exempted from the requirements prescribed in terms of subparagraph (3):

- (a) hang-gliders, including powered hang-gliders;
- (b) unmanned balloons;

- (c) model aircraft;
- (d) paragliders, including powered paragliders and paratrikes; and
- (e) single-seat aircraft, unless used for “hire and fly”.

1.7 Static tests

- (1) Static tests are to be carried out on the aircraft before its first flight.
- (2) The primary aircraft structure must be tested to the limit loads for which the aircraft will be registered.
- (3) A designated airworthiness representative must witness the static test and sign the static test report, referred to in subparagraph (5).
- (4) The aircraft may not have any detrimental permanent deformation or any deformation during and after the static test that may interfere with the safe operation of the aircraft. In addition, there must be full and free movement of the controls while under maximum limit loads.
- (5) A static test report must be submitted to the Executive Director or, if applicable, the organization designated for the purpose in terms of Part 149 of the CAR as the case may be, with the relevant documentation for the application of a proving flight authority.

1.8 Proving flights

- (1) On conclusion of the static test program, the aircraft must undergo proving flights to determine performance, handling and strength substantiation to the extent set out in subparagraph (4).
- (2) Before any proving flights are undertaken, the owner of the aircraft must apply for a Proving Flight Authority as per CAR 24.02.1 and be in the possession of such a Proving Flight Authority, issued in terms of CAR 24.02.3(4).
- (3) The following conditions apply to any proving flights:
 - (a) The flights must be conducted with the aircraft loaded to various masses and ultimately to within 2% of the aircraft’s proposed maximum all-up mass (MAUM) in order to determine the following:
 - (i) climb performance;

- (ii) the altitude at which the rate of climb falls to 50 feet per minute. For multi-engine aircraft, firstly with all engines operating and then with the critical engine feathered or stopped as the case may be;
 - (iii) lateral, longitudinal and directional stability and stalling characteristics;
 - (iv) the maximum level flight speed attainable;
 - (v) the engine operating conditions (temperatures, carburettor icing tendencies);
 - (vi) the accuracy of the airspeed indicating system; and
 - (vii) such other factors as the Executive Director or, if applicable, the organisation designated for the purpose in terms of Part 149 of the CAR as the case may be, considers necessary.
- (b) The results so obtained above must be entered in the airframe logbook. This information must be as complete as possible in order to provide sufficient data to the new owner in case of a change of ownership.
- (c) A final flight test must be carried out at the maximum airspeed (V_{ne}) for which the owner wants the aircraft to be approved. The aircraft structure must then be subjected to the maximum acceleration forces (limit loads), for which it was designed.
- (d) For the flight, referred to in subparagraph (c) above, the following apply:
 - (i) a recording accelerometer in working condition must be carried;
 - (ii) where possible, the pilot must wear a parachute; and
 - (iii) arrangements must be made to permit easy evacuation of the aircraft in the case of a mishap.
- (e) The maximum airspeed, referred to in subparagraph (c), must be chosen by the owner but must at least be 10% more than the maximum level flight speed attainable.

- (f) The maximum acceleration chosen varies with the type of operation to be conducted, and the minimum acceptable to the Executive Director or, if applicable, the organization designated for the purpose in terms of Part 149 of the CAR as the case may be, will be in accordance with the limit loads as stated for each subgroup of aircraft.
- (4) During the course of proving flights, the following flight experience must be gained in respect of the aircraft:
 - (a) a minimum of 25 hours of flight time when an approved or type-certificated aircraft engine is installed; or
 - (b) a minimum of 40 hours of flight time when any other engine is installed; or
 - (c) in the case of the first importation of a production-built aircraft, a minimum of 20 hours, or more at the discretion of the Director; and
 - (d) such other tests or flight experience as the Executive Director considers necessary.
- (5) During the course of the proving flights, a record must be kept of the flight history of the aircraft. The following information must be recorded on Form :
 - (a) the duration of each individual flight counted towards the flight times required in terms of subparagraph (4);
 - (b) a statement of the purpose of each flight; i.e. determining stall characteristics, controllability, or proficiency in preparation for the final flight test as per subparagraph (3)(c);
 - (c) details of any mishaps, incidents or defects (no matter how trivial these may appear to be), and of any other experience encountered and not considered to be entirely normal; and
 - (d) details of all repairs and modifications made to the aircraft, its engines or installed equipment, which updates the build standard.

[Note: Guidance material on how to conduct proving flights can be found in FAA AC 90-89 "Amateur-built Aircraft Flight Testing Handbook" issued by the FAA in conjunction with the US Experimental Aircraft Association (EAA).]

1.9 Noise standards

Any person who applies for the issue of an Authority to Fly for a non-type certificated aircraft must comply with the necessary changes with the appropriate noise standards as prescribed in Part 36 of the regulations.

1.10 Engine emission and fuel venting certification

Any person who applies for the issue of an Authority to Fly for a non-type certificated aircraft must comply with the necessary changes with the appropriate provisions of Part 34 of the regulations.

1.11 Hang-glider towing installations

- (1) The requirements of this subsection are applicable where approval for the aerotowing of a single hang-glider is intended.
- (2) The maximum all-up mass of the hang-glider to be aerotowed, including pilot and all equipment, must be selected by the applicant but may not exceed 200 kg.
- (3) The maximum hang-glider towing speed V_T must be selected by the applicant. V_T must be at least 1,3 V_{SI} , where V_{SI} is the stalling speed of the aeroplane in the cruising configuration without a hang-glider in tow.
- (4) The aeroplane must have proof and ultimate factors of safety of not less than 1,0 and 1,5 respectively, when loads equal to 1,2 of the nominal strength of the weak link are applied through the towing hook installation in the conditions shown below, simultaneously with the loads arising from the most critical normal accelerations at the speed V_T within the limits of the limit and ultimate loads set for the aeroplane.

The conditions applicable are:

- (i) the speed is assumed initially to be at the maximum glider towing speed V_T ; and
- (ii) the load at the towing hook installation is assumed to be acting in each of the following directions, relative to the longitudinal centre line of the aeroplane:
 - (aa) horizontally backwards
 - (bb) backwards and upwards at 40° to the horizontal
 - (cc) backwards and downwards at 20° to the horizontal

- (dd) horizontally backwards and 25° sideways in both directions
- (5) The towing hook must be of a quick-release type. It must be established that with loads equal to 10 percent and 180 percent of the nominal strength of the weak link is applied to the towing hook in each direction prescribed in subparagraph (4) and the release control is operated:
 - (a) the cable will be released;
 - (b) the released cable is unlikely to cause damage to, or become entangled with any part of the aeroplane; and
 - (c) the pilot effort required may not be less than 20 Newton or greater than 100 Newton.
- (6) The release control must be so located that it can be operated by the pilot without having to release any of the primary controls.
- (7) The maximum strength of any weak link which may be interposed in the towing cable must be established. For the determination of loads to be applied for the purpose of this subsection, the strength of the weak link may not be less than 900 Newton.

[Note: Further information may be found in the Australian Airworthiness Design Requirements for weight-shift controlled aeroplanes, and in the book 'Towing Aloft' by Dennis Pagen and Bill Bryden, ISBN 0-936310-13-8, published by Sport Aviation Publications, P O Box 101, Mingoville, PA 16856 USA.]

2. PRODUCTION-BUILT AIRCRAFT

[Note: Attention is drawn to the note under section 1 "Amateur-built aircraft" section 2 prescribes the additional requirements to be met for the design to qualify for aircraft type approval in terms of CAR 24.02.10. Additional requirements are generally in respect of the prototype (first design) aircraft only.]

2.1 Engineering design analysis

The engineering design analysis for a production-built aircraft must –

- (a) for the prototype meet the provisions of Section 1.1; and
- (b) include for a production design, after successful completion of the proving flights with the prototype, with reference to the design analysis submitted in terms of paragraph (2) of Section 1.1, and based on the results of all proving flights, the following:

- (i) recorded, validated performance analysis for complete flight and mass envelope;
- (ii) recorded, validated aerodynamic analysis for complete flight and mass envelope;
- (iii) recorded, validated and detailed structural analysis;
 - (iv) validated and detailed production status engineering design for each part, component and assembly of the aircraft; and
- (v) recorded, validated and proven power plant and propeller (if applicable) and systems analysis for the production status power plant or plants and systems.

2.2 Aircraft type approval

- (1) The requirements for the construction, design, flight performance, power plant, operational and continued airworthiness must be based on either the FAR Part 23, FAR Part 27, BCAR, JAR or equivalent requirements, or any other standard as prescribed for a particular sub-group. In all cases, the requirements may not be less than the requirements prescribed for amateur-built aircraft in Section 1.
- (2)
 - (a) In respect of an imported production-built aircraft, the build standard to which it was manufactured, must be submitted with the documents for registration of the aircraft. This build standard is considered confidential information and the foreign manufacturer may send it directly to the Executive Director or, if applicable, the organization designated for the purpose in terms of Part 149 of the CAR, as the case may be. Where insufficient data for evaluation by the Executive Director is submitted, a full proving flight programme may be demanded.
 - (b) Notwithstanding the provisions of subparagraph (a), the Executive Director may, but is not compelled to waive these requirements in the case of a production-built aircraft approved by an appropriate authority.
 - (c) The complete build standard of a locally to be manufactured production-built aircraft must be submitted to the Executive Director or, if applicable, the organisation designated for the purpose in terms of Part 149, as the case may be, as part of the application for the Authority to Fly of the prototype.

- (d) Any revision to the build standard, made at a later stage, must be submitted by the organisation approved in terms of Subpart 3 of Part 24, or its local agent, to either the Executive Director or the designated organisation, as the case may be, for evaluation.
- (3) In the case of the prototype of a production-built aircraft, static tests must have been carried out to ultimate loads. The ultimate static test must show that the aircraft equals or exceeds a safety factor of 1,5.
- (4) Except as provided for in Section 1.8(4)(c), following the grant of an Authority to Fly to the prototype aircraft, no static tests or proving flights are required for any subsequently manufactured or assembled production-built aircraft of the type, provided that an inspection of each individual aircraft is required to show compliance with the approved build standard. An appropriately rated test pilot must carry out a final flight test on each individual aircraft to satisfy the requirements for the issue of an Authority to Fly to that particular aircraft.
- (5) In the case of the first locally assembled imported production-built aircraft it must be test flown by a pilot who is the holder of a valid Class I or Class II test flight rating, to establish whether the aircraft meets the performances as advertised in the Flight Manual, and whether the aircraft may be safely operated under the weather and geographic conditions prevailing in South Africa. Additional proving flights in terms of Section 1.8(4)(c) may be conducted by an appropriately rated pilot.
- (6) Should the test flights, referred to in subparagraph (5), be unsatisfactorily, and an Authority to Fly refused on the basis thereof, no further import permits may be granted for that type of production-built aircraft, unless revisions to the build standard or new performance test data have been submitted and approved by the Executive Director or, if applicable, the organisation approved for the purpose in terms of Part 149, as the case may be, suggesting that the shortcomings have been corrected. The provisions of subparagraph (5) apply with the necessary changes to the first aircraft imported following any modifications.
- (7) The organisation approved in terms of Subpart 3 of Part 24 to manufacture or assemble a production-built aircraft for which the prototype has been issued with an Authority to Fly must in respect of each further aircraft to be built or assembled ensure that –
- (a) materials, parts and components used conform to those approved for the building standard;

- (b) a proper inspection and test flight programme is in place to satisfy the requirements of subparagraph (4);
 - (c) each aircraft is available for inspection by the Executive Director or the organization approved for the purpose in terms of Part 149, as the case may be; and
 - (d) at all times the technical data and drawings of the build standard, necessary to determine whether the aircraft and its components conform to the build standard, are available at the place of manufacture or assembly of the aircraft.
- (8) Where a production-built aircraft has been delivered in the form of a kit for self-assembly, its owner must meet the provisions of Section 1.3 and Section 1.4. Any deviation from the build plan or assembly instructions must be considered to be a modification, requiring the approval of the Director, or the organisation designated for the purpose in terms of Part 149, as the case may be.
- (9) Where an aircraft is built locally according to the building standard of a production-built aircraft for which an Authority to Fly already has been issued, the provisions of this technical standard, except for subparagraph (3), apply with the necessary changes.

3. VETERAN AIRCRAFT

3.1 General

- (1) The owner of a veteran aircraft must ensure that the aircraft is maintained according to –
- (a) the latest maintenance manuals and schedules approved for the aircraft by the manufacturer; and
 - (b) any additional maintenance instructions issued by the Director.
- (2) Whenever the owner of a veteran aircraft intends to make modifications to a veteran aircraft that would have been considered to be a change to the type certificate, the owner must comply with the provisions of SubPart 3 of Part 21 of the CAR, before applying for a new Authority to Fly.
- (3) The issuing of an Authority to Fly is dependent on the aircraft meeting acceptable airworthiness standards, as prescribed in this Document. Where the service life of the aircraft, as determined by the original manufacturer, has expired, the owner must provide proof that the service life can be safely

extended, and prescribe in his or her approved maintenance schedule or maintenance control manual, as the case may be, the procedures to be followed in monitoring the aircraft's critical components.

3.2 Aircraft documentation

- (1) The owner of a veteran aircraft must submit to the Executive Director copies of the manufacturer's original maintenance and operating manuals, should the Executive Director not already be in the possession of such documents, and must submit to the Executive Director for his or her approval any proposed amendments to such manuals.
- (2) Where no such manuals can be produced, the owner must submit to the Executive Director for his or her approval any document that will support the development of replacement manuals.

4. EX-MILITARY AIRCRAFT

4.1 General

As many ex-military aircraft are of complex design and have equipment and systems that are more complicated and demanding than civil aircraft of comparable mass and size, and which equipment or systems may require particular skills, not normally found amongst licensed AMEs or AMOs, specialist facilities and equipment may have to be provided or arranged for by the owner of such aircraft, and specialist maintenance personnel identified and contracted for the maintenance of the aircraft, before the granting of, and as a condition of an Authority to Fly.

4.2 Maintenance support requirements

- (1) Before permission will be granted for the importation of an ex-military aircraft –
 - (a) the following information, to the extent available, must be submitted to the Director:
 - (i) General:
 - (aa) country of manufacture
 - (bb) number of aircraft of type manufactured
 - (cc) last year of manufacture
 - (dd) organisations that operate or have operated the aircraft type

- (ee) accident history of aircraft type, excluding those caused by military operations
- (ff) primary mission purpose; e.g. trainer, fighter, bomber, etc.
- (gg) standard equipment list
- (hh) mass and balance information
- (ii) list of documentation available
- (jj) manufacturer's support available
- (kk) spare part position
- (ii) Aircraft specific:
 - (aa) date of manufacture
 - (bb) hours flown
 - (cc) flight cycles
 - (dd) service life
 - (ee) accident history, including operational damage incurred
 - (ff) date last flown
 - (gg) current location
 - (hh) modification status
 - (ii) status of aircraft, engine and propeller logbooks or similar documents reflecting the aircraft's history
 - (jj) current equipment list;
- (b) the Executive Director may require the applicant to pay for the costs of an inspector to visit the current location of the aircraft, and the original manufacturer or the current operator. The purpose of the visit would be to inspect the general condition of the aircraft, and to validate the maintenance, training and operational requirements for the aircraft;

- (c) the Executive Director will investigate the aircraft type and its complexity, to determine the level of equipment and technical skill required to maintain the aircraft to an airworthy standard.
- (2) The Executive Director may approve an aircraft maintenance engineer or an aviation maintenance organisation licensed in terms of Part 66 or Part 145, as the case may be, to carry out maintenance on the aircraft and release it for flight, if such person or organisation has demonstrated to the satisfaction of the Executive Director that any of the requirements, determined by the investigation referred to in paragraph (1)(c), can be met.
- (3) In the case of an ex-military jet aeroplane, an ex-military aeroplane with a maximum certificated mass in excess of 5 700 kg, or an ex-military helicopter with a maximum certificated mass in excess of 3 175 kg, the owner or operator must draw up and have approved by the Executive Director a Maintenance Control Manual in accordance with the provisions of Technical Standard 43.02.3 in Document NAM-CATS 43. The Maintenance Control Manual must include the Memorandum of Agreement between the owner of the aircraft and the approved maintenance personnel or organisations, approved by the Executive Director for the purpose.
- (4) The owner must designate one person who will be responsible for the maintenance oversight, the liaison between owner and maintenance personnel, and the liaison with the Civil Aviation Authority on airworthiness matters.
- (5) The owner of ex-military jet aircraft must ensure that all the service data of the aircraft, both past and present, be kept up to date and remain available for scrutiny inspections.
- (6) In respect of aircraft without historical service data the owner must submit to the Director, as part of the Maintenance Control Manual, a schedule which satisfies the Executive Director that the “on-condition” airworthiness of the aircraft is ensured. Such schedule must have been drawn up by a suitably qualified organisation approved in terms of Part 147 of the CAR.
- (7) Where an ex-military aircraft is still supported by its original manufacturer, the owner must comply with any airworthiness directives or similar instructions issued by the manufacturer. It is the owner’s responsibility to arrange for a technical subscription service for him or herself, as well as for the Civil Aviation Authority.

1.3 Specialised equipment and systems

- (1) Many ex-military aircraft contain specialised technical equipment or systems, particular either to the role of the aircraft or the conditions under which it was designed to operate, or both. From a design consideration, the Executive Director may grant an Authority to Fly on the basis of a reasonable military service accident record but discounting military action and high-risk training.
- (2) Specialised systems include:
 - (a) oxygen, either liquid or gaseous;
 - (b) pressurisation;
 - (c) ejection seats;
 - (d) flying clothing;
 - (e) emergency and back-up systems, brake-parachutes etc.;
 - (f) instrumentation for flight under Instrument Flight Rules (IFR);
 - (g) external fuel tanks, pylons etc.;
 - (h) digital flight systems;
 - (i) electronic flight instrument system.
- (3) To maintain the service record under civil control, the aircraft must be maintained as far as possible to the standards used in military service. Its minimum equipment list, required in terms of Part 94 or Part 96, must prescribe which equipment must be serviceable before the commencement of a particular operation.
- (4) In order to support these foregoing principles, the aircraft must be maintained in accordance with the instruction manuals used whilst in military service (e.g.: Aircrew Notes, Ministry of Defence Maintenance Schedules, etc.). Where considered necessary for a safe operation in the civil environment, the Executive Director may issue additional instructions. All such manuals and additional instructions must be listed in the Maintenance Control Manual.
- (5) Where specialised equipment, facilities or personnel are required to ensure the serviceability of the equipment (e.g. ejection systems), these must be provided by approved personnel or organisations as referred to in subparagraph (2) of section 4.2.

(6) Digital Flight Systems and Electronic Flight Instrument Systems

Where an aircraft has digital flight systems or electronic flight instrument systems (EFIS) in whole or in part, their use must require the approval of the Director.

(7) Modifications

The disarming or removing of jettison circuits, gun sights or auxiliary equipment is considered to be modifications, requiring the approval of the Director.

5. MICROLIGHT AEROPLANES

5.1 Design standards

Non-type certificated microlight aeroplanes must meet the design criteria of either amateur-built aircraft or production-built aircraft.

5.2 Classification perimeters

- (1) For an aeroplane to be classified as a microlight aeroplane, the following perimeters need to be met:
 - (a) minimum flying speed at maximum take-off mass to be less than 65 km/h;
 - (b) maximum take-off mass of –
 - (i) 300 kg for a single-seater landplane;
 - (ii) 330 kg for a single-seater amphibian or seaplane;
 - (iii) 450 kg for a two-seater landplane; or
 - (iv) 495 kg for a two-seater amphibian or seaplane.
- (2) For the purposes of establishing conformity with subparagraph (1)(b), the following payloads are to be included:
 - (a) Per seat: 84 kg.
 - (b) The lesser of full fuel load or –
 - (i) 15 kg in the case of a single-seater; or
 - (ii) 22 kg in the case of a two-seater.

- (3) The perimeters referred to in subparagraph (1) apply also to aircraft that are foot-launched (hang-gliders) or having a wing of a non-rigid structure (paragliders).

6. HELICOPTERS

6.1 Design standards

- (1) Non-type certificated helicopters must meet the design criteria of either amateur-built aircraft or production-built aircraft.
- (2) Design loads:
 - (a) The load conditions and requirements of FAR 27 Subpart C – Strength requirements (or its equivalent) must be considered in the design of the aircraft.
 - (b) FAR Part 27 paragraphs 27.301, 27.309, 27.321, 27.337, 27.339, 27.3441, 27.361, 27.547 and 27.549 must be complied with.

7. GYROPLANES AND GYROGLIDERS

7.1 Design standards

- (1) Non-type certificated gyroplanes and gyrogliders must meet the design criteria of either amateur-built aircraft or production-built aircraft.
- (2) A rotor brake and rotor RPM gauge must be installed.
- (3) Design loads:
 - (a) The load conditions and requirements of the British BCAR section S and of FAR 27 Subpart C – “Strength Requirements” (or their equivalent) must be considered in the design of the gyroplane or gyroglider.
 - (b) FAR Part 27 paragraphs 27.301, 27.309, 27.321, 27.337, 27.339, 27.3441, 27.361, 27.547 and 27.549, as applicable to gyroplanes and gyrogliders, must be complied with.

8. GLIDERS, INCLUDING POWER-ASSISTED AND TOURING GLIDERS

8.1 Design Standards

- (1) Non-type certificated gliders, including power-assisted and touring gliders, must meet the design criteria of either amateur-built aircraft or production-built aircraft, or the requirements of Part 22 of the JAR, or of FAR 31.
- (2) The wing loads of power-assisted and touring gliders may not exceed the following:
 - (a) mass
 - (b) $(\text{span})^2 \leq 3 \text{ kg/m}^2$
- (3) The maximum all-up mass of –
 - (a) a glider may not exceed 750 kg; and
 - (b) a power-assisted and a touring glider may not exceed 850 kg.
- (4) The seating capacity of any glider may not exceed two.

9. HANG-GLIDERS, INCLUDING POWERED HANG-GLIDERS

9.1 Design Standards

Non-type certificated hang-gliders, including powered hang-gliders, must meet the design criteria of either amateur-built aircraft or production-built aircraft to the extent applicable.

9.2 Classification perimeters

- (1) Hang-gliders must meet the same classification perimeters to the extent applicable as set for microlight aeroplanes. These perimeters are:
 - (a) minimum flying speed at maximum take-off mass to be less than 65 km/h;
 - (b) maximum take-off mass of –
 - (i) 300 kg for a single-seater hang-glider; and
 - (ii) 450 kg for a two-seater hang-glider.
- (2) For the purposes of establishing conformity with subparagraph (1)(b), the following payloads are to be included:
 - (a) Per seat: 84 kg.
 - (b) The lesser of full fuel load or –
 - (i) 15 kg in the case of a single seater; and
 - (ii) 22 kg in the case of a two-seater.

9.3 Towing Equipment Standards

- (1) Hang-gliders are often launched by means of any of these five methods of towing:
 - (a) Static tow line
 - (b) Pay-out winch and platform launch
 - (c) Pull-in or static winch
 - (d) Reflex static winch
 - (e) Aerotow
- (2) All releases fitted to hang-gliders must release at any angle and at any load that may be applied during tow. All releases must be infallible and must only release upon pilot activation (with the exception of automatic release systems which are sometimes used in training). Weak links built into the bridle that trigger release are not recommended. Rope or string releases are not recommended as string loops used in these releases may twist and fail to release.
- (3) The maximum all-up mass of a hang-glider to be aerotowed, including pilot and all equipment, may not exceed 200 kg.
- (4) Full details on acceptable standards may be found in the Towing Procedures Manual of the Hang-Gliding Federation of Australia, and in the book "Towing Aloft" by Dennis Pagen and Bill Bryden, ISBN 0-936310-13-8, published by Sport Aviation Publications, P O Box 101, Mingoville, PA 16856 USA.

9.4 Approved design standards

The design standards issued by the approved organisations listed in Technical Standard 24.04.3 are acceptable to the Director.

10. PARAGLIDERS, INCLUDING POWERED PARAGLIDERS

10.1 Design Standards

- (1) Non-type certificated paragliders, including powered paragliders, must meet the design criteria of either amateur-built aircraft or production-built aircraft to the extent applicable.
- (2) Design loads:

- (a) To the extent applicable, the load conditions and requirements of the British CAR section 6 (or its equivalent) must be considered in the design, in addition to UK CAA Paper No. 848.
- (b) A stress analysis of the canopy must be submitted.

10.2 Classification perimeters

- (1) Paragliders must meet the same classification perimeters to the extent applicable as set for microlight aeroplanes. These perimeters are:
 - (a) minimum flying speed at maximum take-off mass to be less than 65 km/h;
 - (b) maximum take-off mass of –
 - (i) 300 kg for a single-seater paraglider; and
 - (ii) 450 kg for a two-seater paraglider.
- (2) For the purposes of establishing conformity with subparagraph (1)(b), the following payloads are to be included:
 - (a) Per seat: 84 kg.
 - (b) The lesser of full fuel load or –
 - (i) 15 kg in the case of a single seater; and
 - (ii) 22 kg in the case of a two-seater.

10.3 Towing Equipment Standards

- (1) Paragliders are often launched by means of any of these four methods of towing:
 - (a) Static tow line
 - (b) Pay-out winch and platform launch
 - (c) Pull-in or static winch
 - (d) Reflex static winch
- (2) All releases fitted to paragliders must release at any angle and at any load that may be applied during tow. All releases must be infallible and must only release upon pilot activation (with the exception of automatic release systems which are sometimes used in training). Weak links built into the bridle that trigger release are

not recommended. Rope or string releases are not recommended as string loops used in these releases may twist and fail to release.

- (3) Full details on acceptable standards may be found in the Towing Procedures Manual of the Hang Gliding Federation of Australia, and in the book “Towing Aloft” by Dennis Pagen and Bill Bryden, ISBN 0-936310-13-8, published by Sport Aviation Publications, P O Box 101, Mingoville, PA 16856 USA.

11. PARACHUTES

11.1 Design Standards

- (1) Main parachutes must be manufactured by an organisation, approved in terms of Part 147 or Part 148 to standards developed in-house.
- (2) Reserve parachutes must meet the design standards of ZS-TSO C27(c) or later version.
- (3) Harnesses for pilot and passenger, and for the reserve parachute must –
 - (a) meet the design standards of ZS-TSO C27(c) or later version; or
 - (b) have been approved by an authority recognised for the purpose by the Director.

12. MANNED CAPTIVE AND FREE BALLOONS

12.1 Design Standards

- (1) Non-type certificated manned balloons must meet the design criteria of either amateur-built aircraft or production-built aircraft.
- (2) Design loads:

The load conditions and requirement of the US FAR 31 Subpart C “Strength Requirements” document or its equivalent must be complied with.

13. AIRSHIPS

13.1 Design Standards

- (1) Non-type certificated airships must meet the design criteria of either amateur-built or production-built aircraft.
- (2) Design loads:

- (a) The load conditions and requirements of FAR 31 Subpart C “Strength Requirements” (or its equivalent), as well as those of BCAR section Q or FAA P-8110-2, Change 1 “Airship Design Criteria”, that are applicable, must be complied with.
- (b) AC 21.17-1A, Change 1, provides acceptable criteria for the design of non-rigid airships.

14. MODEL AIRCRAFT

14.1 General Characteristics of Model Aircraft

- (1) The general characteristics of model aircraft are set by the Federation Aeronautique Internationale and may be found in section 4 of its document ABR, Part 4 C.
- (2) Unless otherwise stated, model aircraft must meet the following general specifications:
 - (a) maximum flying weight with fuel 25 kg;
 - (b) maximum surface area 5 m²;
 - (c) maximum loading 5 kg/m²;
 - (d) maximum swept volume of piston motor(s) 250 cm³;
 - (e) electric motors power source maximum no-load voltage 42 volts;
 - (f) metal-bladed propellers are prohibited.
- (3) Model helicopters must meet the following general specifications:
 - (a) Maximum weight with fuel 5 kg;
 - (b) maximum swept area of the lifting rotor(s) counting only once any superimposed areas 3 m²;

 Provided that in the case of co-axial model helicopters whose rotors are further than one rotor diameter apart, the total area of both rotors is counted;
 - (c) piston motor swept volume maximum 10 cm³;
 - (d) rubber motor no restrictions.

- (4) Free-flying model aircraft Free-flying model aircraft that are neither radio- or line-controlled may not have a maximum mass exceeding 5 kg.
- (5) Noise limitations:
 - (a) Noise limitations must be applied to powered model aircraft categories, with 96 dB (A) at 3 meters for any category, which does not have approval for any other noise rule. Specific noise measuring procedures are to be developed by relevant national body in which model aircraft operators are associated.
 - (b) Noise limits do not apply to model aircraft with electric motors.

15. OTHER AIRCRAFT

15.1 Design Standards

Non-type certificated aircraft other than those provided for in the above sections 3 to 14 must meet the design criteria of either amateur-built aircraft or production-built aircraft.

16. LIGHT SPORT AEROPLANES

16.1 Design standards

Non-type certificated light sport aeroplanes must meet the design criteria of either amateur-built aircraft or production built aircraft.

16.2 Classification parameters

- (1) For an aeroplane to be classified as a light aeroplane, the following parameters need to be met:
 - (a) Maximum gross take-off mass of:
 - (i) 600 kilograms for land planes;
 - (ii) 650kg for amphibian and sea planes.
 - (b) Maximum stall speed with no flaps deployed at MAUW 45 knots;
 - (c) Maximum speed in level flight maximum continuous power 150 knots;
 - (d) Two place maximum;
 - (e) Single, non-turbine engine;

- (f) Unpressurised cabine.
- (2) For the purpose of establishing conformity with sub-paragraph (1) (a), the following payloads are to be included:
 - (a) 80 kilograms per seat;
 - (b) Full fuel tank or 40kg (whichever is greater);
 - (c) Luggage mass as specified by the manufacturer;
 - (d) Safety rescue system if one is fitted;
 - (e) All standard and additional equipment and systems as fitted.

24.01.4 AIRCRAFT DOCUMENTATION

1. Documentation to be submitted for approval

- (1) The owner of a non-type certificated aircraft, or the manufacturer of a production-built aircraft, as the case may be, classified in the subparagraphs (a) to (g) of CAR 24.01.1(2) of must submit to the Executive Director or, if applicable, the organization designated for the purpose in terms of Part 149 of the CAR as the case may be, for approval aircraft documentation in the form of a Flight Manual and a Maintenance Schedule. These documents must be submitted after all static and proving flight tests in terms of Sections 1.9 and 1.10 have been carried out satisfactorily.
- (2) The flight manual must describe the flight control and flight limitations of the aircraft and cover both normal and emergency procedures.
- (3) The contents must be in the following order:
 - (a) general;
 - (b) limitations;
 - (c) normal procedures;
 - (d) emergency procedures;
 - (e) performance data;
 - (f) mass and balance;
 - (g) optional equipment and changes to above sections due to incorporation of optional equipment.

- (4) The general section must contain the following information:
 - (a) aircraft make;
 - (b) aircraft model;
 - (c) aircraft serial or build number;
 - (d) aircraft registration number;
 - (e) name of the original constructor of the aircraft; and
 - (f) include a colour photo of the particular aircraft showing the nationality and registration marks.
- (5) The Maintenance Schedule must be in the format prescribed in regulation 24.03.1, and must describe which items are to be inspected in what manner during mandatory inspections.
- (6) The manufacturer of a production-built aircraft, in addition to the documents prescribed in paragraph (1), must submit for approval a maintenance manual and a part list. The maintenance manual must describe all maintenance required to ensure continued airworthiness of the aircraft. The part list must identify the various parts used in the manufacture of the aircraft, to facilitate part replacement in accordance with the build standard.

24.01.5 INSTRUMENTS, EQUIPMENT AND PLACARDS

1. Minimum equipment

- (a) The minimum equipment prescribed in CAR 24.01.5 for each sub-group of aircraft must be the minimum equipment as prescribed by CAR 24.01.2(5)(a) and Part 91, Part 94 or Part 96 to the extent applicable to the operation of the particular type of non-type certificated aircraft.
- (b) Whenever a non-type certificated aircraft is used for training purposes, a suitable and serviceable communication system between instructor and student must be available for use.
- (c) For each seat, approved types of safety belts or harnesses must be installed in accordance with FAA AC 43-13.2A.

2. Placards

Hang-gliders, paragliders and parachutes must carry a label, stating the manufacturer's name, date of manufacture, a serial number, the quality controller's signature, pilot mass rating and, if applicable, the class rating.

24.02.2 REQUIREMENTS

1. Proving Flights

The requirements in respect of proving flights and of performance, handling and strength tests are those prescribed in Section 1.8 for the respective sub-groups of aircraft.

2. Typical documentation

Typical documentation required to show compliance with the provisions of subregulation (1) of CAR 24.02.2 will be the foreign certificates of de-registration and permits, or a certificate of non-registration, as well as the standards and substantiation to which the aircraft was built and approved.

3. Annual Inspection

The annual inspection, referred to in CAR 24.02.2(5)(d) is the annual inspection prescribed in NAM-CATS 44.

24.02.3 ISSUING

1. Proving Flights

The requirements in respect of proving flights are those prescribed in Section 1.8 for the respective sub-groups of aircraft.

24.03.1 APPROVED MAINTENANCE SCHEDULE

1. Introduction

The Approved Maintenance Schedule (AMS), referred to in Regulation 24.02.1 and which may be issued in separate parts, must contain a description of the procedures to be followed, to the extent applicable, to ensure that –

- (a) the aircraft is maintained in an airworthy condition;
- (b) the operational and emergency equipment, required for an intended flight, is serviceable;
- (c) the Authority to Fly or the Proving Flight Authority, as the case may be, remains valid for each aircraft to which the AMS applies;

- (d) a description of the administrative and contractual arrangements between the owner and the person or persons approved to carry out maintenance on the aircraft; and
- (e) a description of the maintenance procedures and the procedures for completing and signing a release to service, when maintenance is based on a system other than that of an approved aviation maintenance organization.

2. Format

The AMS must contain the following information:

- (a) Maintenance tasks and the intervals at which these are to be performed, taking into account the anticipated utilisation of the aircraft.
- (b) When applicable, a continuing structural integrity programme.
- (c) Procedures for changing or deviating from (a) and (b) above.
- (d) When applicable, condition monitoring and reliability programme descriptions for aircraft systems, components and powerplants.

3. Inspection schedule

The maintenance tasks and the intervals, referred to in subparagraph 2(a), must include –

- (a) daily inspections;
- (b) pre-flight inspections; and
- (c) mandatory periodic inspections;

as applicable to the type of aircraft.

24.03.2 ANNUAL INSPECTIONS

1. Items to be inspected

- (a) The minimum requirements for an annual inspection of an amateur-built or production-built aircraft must be as per Annex A.
- (b) The minimum requirements for an annual inspection of a manned free balloon must be as per Annex B.
- (c) The minimum requirements for a mandatory periodic inspection of a veteran or ex-military aircraft must be those specified by the original manufacturer for such inspection, unless the aircraft is on a progressive maintenance schedule.
- (d) The annual inspections, referred to in paragraphs (a) and (b), must be carried out not later than 12 months since the previous inspection.

- (e) Where an aircraft is on a progressive maintenance schedule, the cycle must be completed within a 12 months period.
- (f) Annual inspections must be carried out normally either by or under the direct supervision of a licensed AMO or AME or an Approved Person, with the appropriate rating or ratings for the type of aircraft, or in the case of an amateur-built aircraft by the person responsible for the original construction.
- (g) Parachutes must be inspected and re-packed by a licensed parachute packer at least once every 12 months, or more frequently at the manufacturer's recommendation.

2. Annual Inspection Form

The annual inspection form to be completed and forwarded after each annual inspection is Form FSS-AIR-FORM078/12. See Annex D.

3. Record keeping

- (1) An owner must ensure that the following records are kept for the periods mentioned –
 - (a) The total time in service (hours, calendar time and cycles, as appropriate) for the aircraft and all life-limited components.
 - (b) The current status of compliance with all mandatory continuing airworthiness information.
 - (c) Appropriate details of modifications and repairs to the aircraft and its major components.
 - (d) The time in service (hours, calendar time and cycles, as appropriate) since last overhaul of the aircraft or its components subject to a mandatory overhaul life.
 - (e) The current aircraft status of compliance with its maintenance schedule.
 - (f) The detailed maintenance records to show that all requirements for signing of a release to service have been met.
- (2) The records, referred to in subparagraphs (1)(a) to (e), must be kept for a minimum period of 90 days after the aircraft or item to which they refer has been permanently withdrawn from service.
- (3) The records, referred to in subparagraph (1)(f), must be kept for a minimum period of one year after the signing of the release to service.
- (4) In the event of a change of ownership in the aircraft, the above maintenance records must be transferred to the new owner.

(5) See also [Part 43](#) of the CAR of 2001 as amended.

24.03.3 APPROVED ORGANISATIONS

1. Test authorities approved for the certification of hang-gliders, paragliders and parachutes.

The following test authorities have been approved by the Executive Director or the organisation designated for the purpose in terms of Part 149, as the case may be, for the certification of hang-gliders, paragliders and parachutes:

- (a) AFNOR (The French ACPULS certification)
- (b) AHGF (The Australian Hang Gliding Federation)
- (c) BCAR (British Civil Aviation Regulations)
- (d) DHV (The German GUTE SIEGEL certification)
- (e) DULV (Deutsche Ultraliecht Verein)
- (f) HMA (US Hang-gliding Manufacturers Association)
- (g) SAPA (The South African Parachute Association reserve parachute testing procedure)
- (h) SHV (The Swiss Hang Verein certification)
- (i) USHGA (The United States Hang Gliding Association)

ANNEXURES

Annex A

CHECKLIST FOR AERODYNAMIC ANALYSIS

(Include as applicable)

1. AEROPLANES

- 1.1 Aeroplane type
- 1.2 Intended aeroplane application
- 1.3 Aeroplane configuration:
 - (a) Wings
 - (b) Fuselage
 - (c) Empennage
 - (d) Power plant range
- 1.4 Wing details:
 - (a) Plan form
 - (b) Wing span
 - (c) Wing cord at root and at tip
 - (d) Wing area
 - (e) Wing aspect ratio
 - (f) Wing thickness (%) at root and at tip
 - (g) Wing location
 - (h) Airfoil at root and at tip
 - (i) Spar material
 - (j) Wing rib material
 - (k) Skin material
 - (l) Lift augmentation devices
- 1.5 Undercarriage configuration and type