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# ZAMBIA CIVIL AVIATION REQUIREMENTS



**JUNE 2016**

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**FOREWORD**

Part 18 of the Zambia Civil Aviation Requirements sets forth the requirements applicable to RPAS operations in Zambia. These Requirements also provide for the guidelines for Remotely Piloted Aircraft Systems operations.

It must be noted that ICAO has not yet developed RPAS Standards, however, the promulgation of these Requirements has taken into consideration the relevant provisions of other ICAO Standard requirements such as those in Annexes 1, 2, 6, 7, 8, 9, 10, 11, 17 and 19 that deal with issues pertaining to Personnel licensing, rules of the air, Operations of aircraft, air worthiness of aircraft, facilitation of aircraft, Aeronautical telecommunications, Air traffic services, Security and Safety Management for purposes of enhancing the safe operations of RPAS.

This part of the ZCARs provides both guidelines and requirements that all prospective RPAS users must comply with at all times. Any contravention of these provisions shall attract sanctions in line with the enforcement provisions of the Civil Aviation Authority Act No. 7 of 2012 and the Civil Aviation Act No. 5 of 2016.

**Director General  
Civil Aviation Authority**

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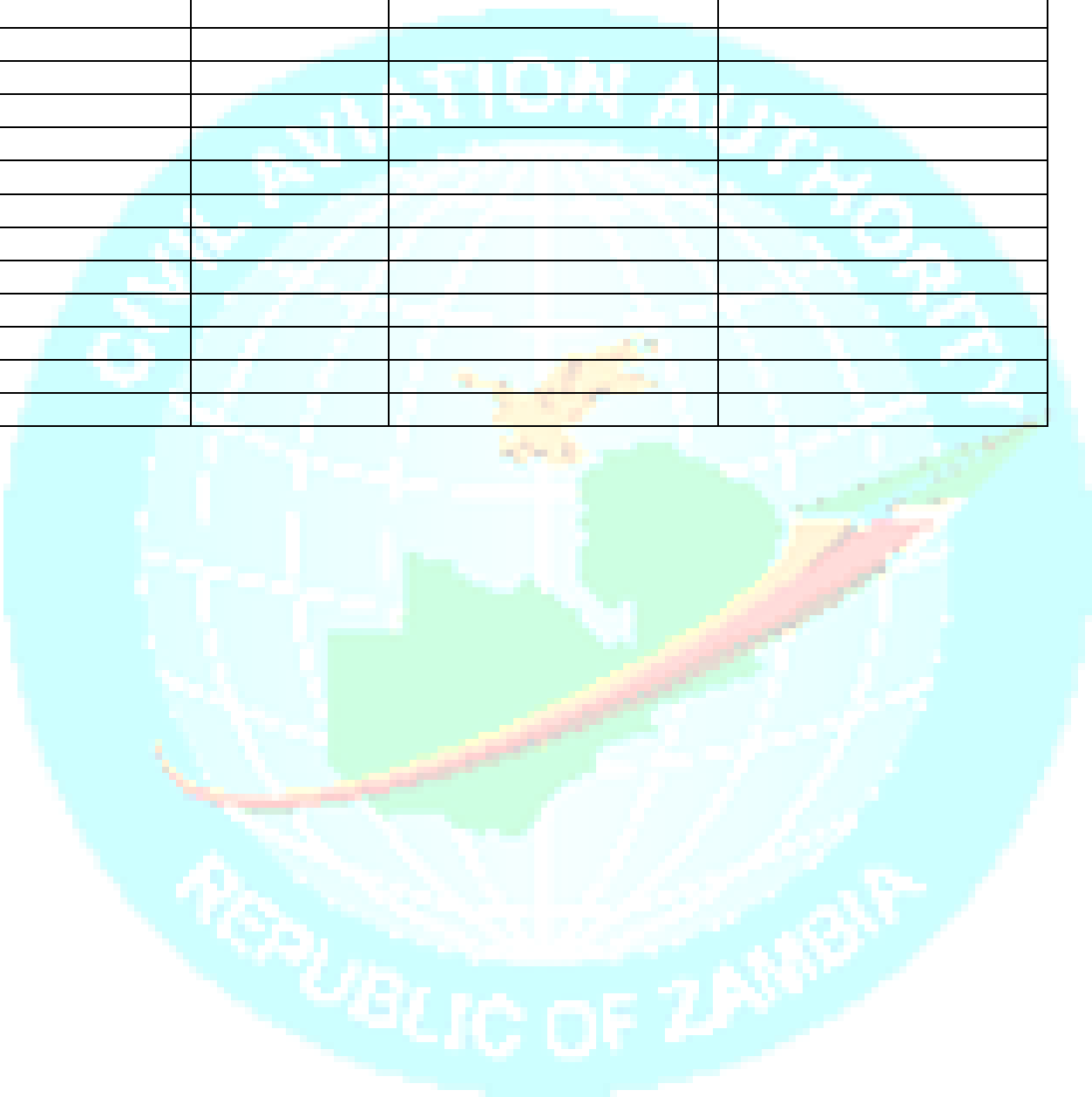
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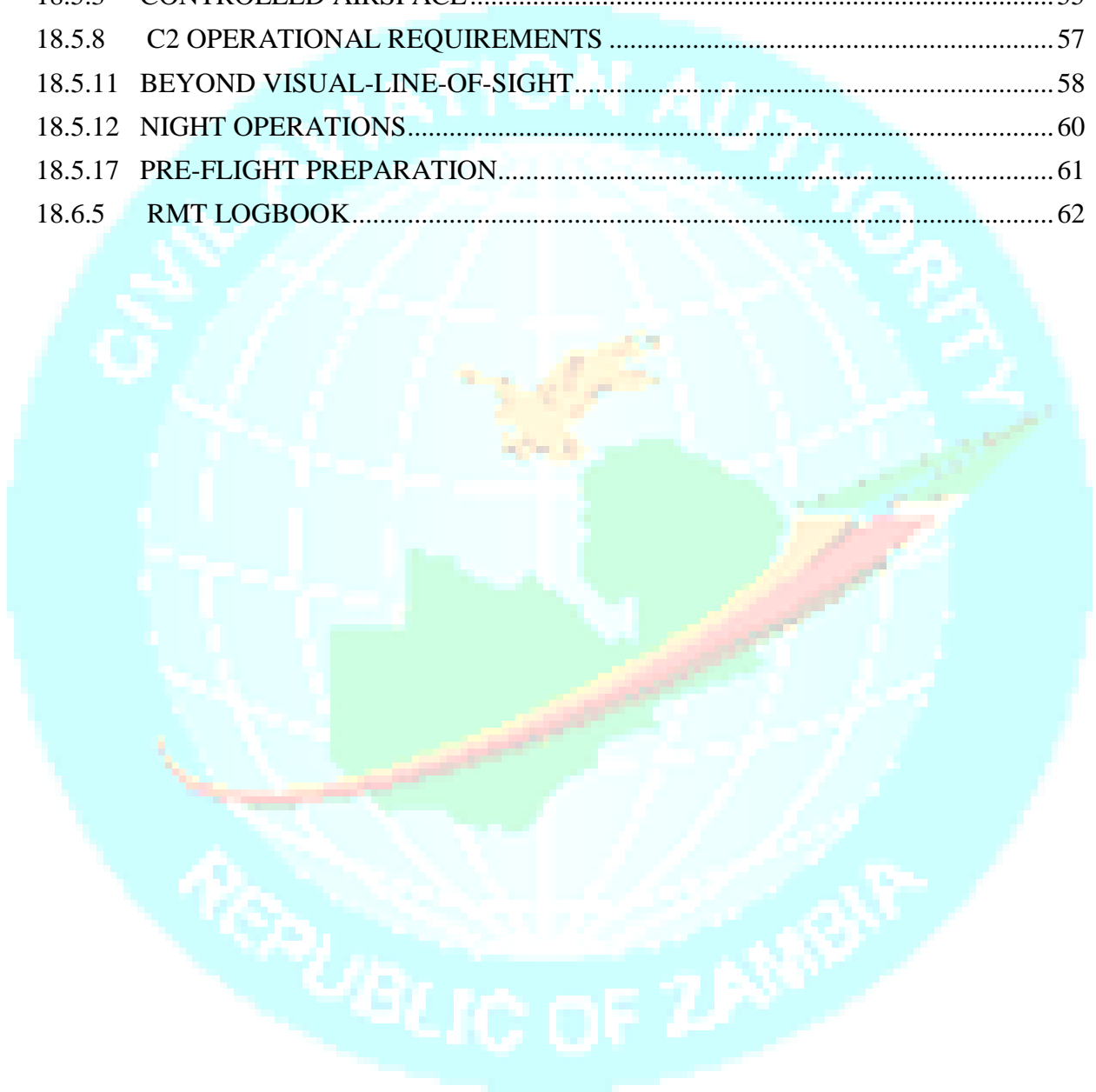
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## PART 18 – REMOTELY PILOTED AIRCRAFT SYSTEMS (RPAS)

### 18.1 GENERAL PROVISIONS

#### 18.1.1 Definitions

For the purposes of this Part, unless the context otherwise indicates, the following definitions shall apply –

- (a) **“authorized officer”**, means an employee of the Authority authorized to perform certain functions of the Authority or to who functions have been delegated in accordance with Civil Aviation Act.
- (b) **“autonomous unmanned aircraft”** means an unmanned aircraft that does not allow intervention in the management of the flight;
- (c) **“autonomous operation”** is an operation during which an unmanned aircraft is operating without intervention in the management of the flight;
- (d) **“background check”** means the checking of a person’s identity and previous experience, including any criminal history as part of the assessment of an individual’s suitability to implement a security control and/or for unescorted access to a security restricted area;
- (e) **“beyond visual line-of-sight”** means an operation in which the remote pilot cannot maintain direct unaided visual contact with the remotely piloted aircraft to manage its flight and to meet separation and collision avoidance responsibilities visually;
- (f) **“command and control link”** means the data link between the remotely-piloted aircraft and the remote pilot station for the purposes of managing the flight;
- (g) **“communication link”** means a digital or analogue data link to transfer voice or data between the remote crew, air traffic control, airspace users and other data users;
- (h) **“corporate operation”**, means a non-commercial operation or use of RPAS by an entity for professional or aerial work as an aid to the conduct of business of that entity;
- (i) **“down-link”** means the direct or indirect communication link form the RPA;
- (j) **“extended visual line-of-sight”** means an operation below 400 ft AGL in which an observer maintains direct and unaided visual contact with the remotely piloted aircraft at a distance not exceeding 1000 m from the pilot;



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- (k) **“extended visual line-of-sight operation”** means an operation below 400 ft AGL, in which an RPA observer assists in the direct unaided visual contact with the RPA, in order to facilitate separation and collision avoidance requirements;
- (l) **“model aircraft”** means a non-human-carrying aircraft capable of sustained flight in the atmosphere and used exclusively for air display, recreational, sport or competition activity;
- (m) **“observer”** means a trained and competent person designated by the operator who, by visual observation of the remotely piloted aircraft, assists the remote pilot in the safe conduct of the flight;
- (n) **“payload”** includes all elements of an RPAS that are not necessary for flight but that are carried for the purpose of fulfilling specific mission objectives;
- (o) **“private operation”** means the use of an RPA for an individual’s personal and
  - (p) private purposes where there is no commercial outcome, interest or gain;
- (q) **“radio line-of-sight”** means a direct electronic point-to-point contact between a transmitter and receiver;
- (r) **“remote pilot”** means the person who manipulates the flight controls or manages the flight command instructions of a remotely-piloted aircraft during flight time;
- (s) **“remote pilot station”** means the station at which the remote pilot manages the flight of the remotely piloted aircraft;
- (t) **“remotely piloted aircraft”** means an unmanned aircraft which is piloted from a remote pilot station, excluding model aircraft and toy aircraft as defined in this Part;
- (u) **“remotely piloted aircraft system”** means a set of configurable elements consisting of a remotely piloted aircraft, its associated remote pilot station(s), the required command and control links and any other system elements as may be required at any point during flight operation;
- (v) **“restricted visual line-of-sight”** means an operation within 500 m of the RPA pilot and below the height of the highest obstacle within 300 m of the RPA, in which the remote pilot maintains direct unaided visual contact with the remotely

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piloted aircraft to manage its flight and meet separation and collision avoidance responsibilities;

- (w) **“toy aircraft”** means a product designed or intended, whether or not exclusively, for use in play by children, and falling under the definition of aircraft.;
- (x) **“visual line-of-sight”** means an operation below 400 ft AGL in which the remote pilot maintains direct and unaided visual contact with the remotely piloted aircraft at a distance not exceeding 500 m.

*Note: See Pictorial view of VLOS and EVLOS in TGM – RPAS Regulations*

### 18.1.2 Abbreviations

For the purpose of these regulations, the following abbreviations shall apply:

- (a) **AGL** means above ground level;
- (b) **ATC** means Air Traffic Control;
- (c) **C2** means command and control link;
- (d) **B-VLOS** means beyond visual line of sight;
- (e) **CAMU** means Central Airspace Management Unit;
- (f) **CAR** means Civil Aviation Regulations
- (g) **E-VLOS** means extended visual line of sight;
- (h) **FUA** means Fair Use of Airspace;
- (i) **MTOM** means maximum take-off mass;
- (j) **OpSpec** means operational specifications;
- (k) **RLA** means an RPA letter of approval;
- (l) **RLOS** means radio line of sight;
- (m) **RMT** means RPAS maintenance technician; **ROC** means RPAS operators certificate;
- (n) **RPA** means remotely piloted aircraft;
- (o) **RPAS** means remotely piloted aircraft system;
- (p) **RPL** means a remote pilot licence;
- (q) **RPS** means remote pilot station;
- (r) **R-VLOS** means restricted visual line of sight;
- (s) **VLOS** means visual line of sight.

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### 18.1.3 Applicability

- (a) This Part applies to –
  - (1) Class 1 and 2 of remotely piloted aircraft, unless otherwise approved by the Director General; and
  - (2) Owners, persons acting as owners, operators, observers, pilots and in the performance of maintenance of remotely piloted aircraft.
- (b) For the purposes of this Part, RPAS may be operated for the following purposes:
  - (1) Commercial operations;
  - (2) Corporate operations;
  - (3) Non-profit operations; and
  - (4) Private operations.
- (c) This Part does not apply to –
  - (1) Autonomous unmanned aircraft, unmanned free balloons and their operations or other types of aircraft which cannot be managed on a real-time basis during flight;
  - (2) An aircraft operated in terms of ZCARs part 19 (**Operations of Non-Type Certificated Aircraft**); and
  - (3) Toy aircraft.

### 18.1.4 Private operations

- (a) Subject to sub-regulation (2), the provisions of parts 2, 3, 4 and 6 of this Part do not apply to private operation of RPAS.
- (b) Private operations of RPAS shall be conducted only in R-VLOS with a Class 1A or 1B RPA.

### 18.1.5 Grouping and classification

RPAS shall be grouped in accordance with the classifications as prescribed in Document ZCARs Part 18

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### 18.1.6 Directives

The Director General may, from time to time, issue directives which are necessary for safe and secure operation of RPAS.

### 18.1.7 RPA sales or re-sales

No RPA shall be sold within the Republic of Zambia unless the seller has written approval by the Director General in accordance with ZCARs Part18.



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## 18.2 APPROVAL AND REGISTRATION RPA

### 18.2.1 Letter of Approval

- (a) No RPA shall be operated within the Republic of Zambia, unless such RPA has been issued with a Remotely Piloted Aircraft System Letter of Approval (RLA) by the Director General.
- (b) An application for the issuance or renewal of an RLA shall be made to the Director General on the appropriate form and accompanied by the appropriate fee. The Director General shall issue an RLA if the applicant complies with the requirements prescribed in regulation 2.2.
- (c) An RLA shall be valid for a period of 12 months.

### 18.2.2 RPAS system safety

- (a) An applicant for the issue of an RLA, shall provide the Director General with:
  - (1) Documentation regarding the standard to which the RPA was designed; or
  - (2) Equivalent documentation that demonstrates a level of safety acceptable to the Director General; or
  - (3) Documentation demonstrating system safety as prescribed in Document ZCARs PART 18.

### 18.2.3 Altimeter

- (a) Except as provided in regulation (2), an RPA shall be equipped with an altimetry system that is capable of displaying to the operator on the Remote Pilot Station (RPS), the height of the RPA above the surface.
- (b) An RPA that is not equipped with an altimetry system required by regulation (1) shall only be operated under R-VLOS.

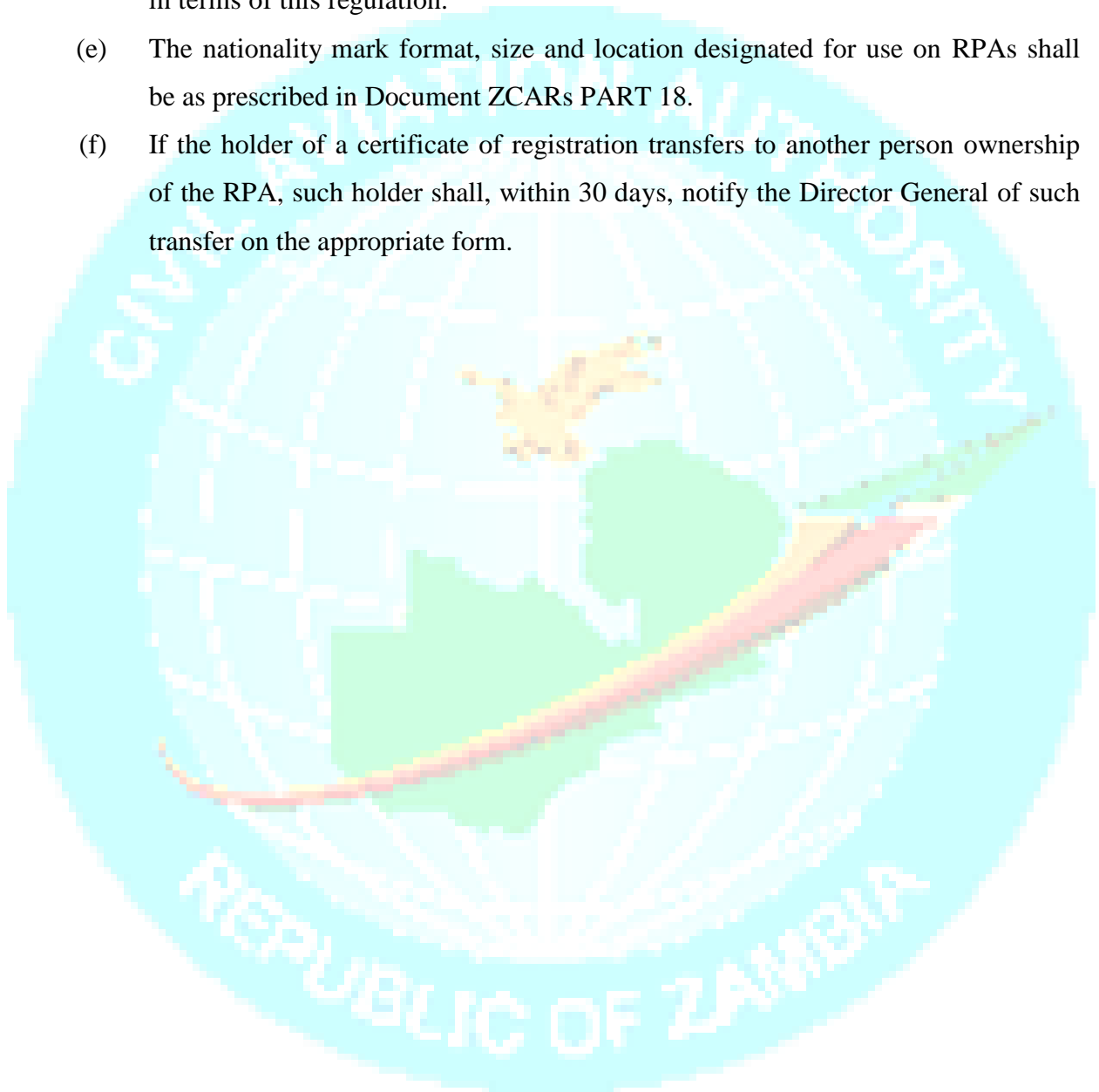
### 18.2.4 Registration and marking

- (a) No RPA shall be operated, unless such RPA holds a valid certificate of registration issued by the Director General.
- (b) An RPA registered on the Zambian Civil Aircraft Register shall be deemed to have Zambian nationality.
- (c) An application for a certificate of registration shall be –
  - (1) made on the prescribed form; and

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(2) Accompanied by the prescribed fee.

- (d) The Director General shall register an RPA, issue a certificate of registration and a registration mark if the applicant complies with the requirements of this regulation. The Director General shall maintain a register of all RPAs registered in terms of this regulation.
- (e) The nationality mark format, size and location designated for use on RPAs shall be as prescribed in Document ZCARs PART 18.
- (f) If the holder of a certificate of registration transfers to another person ownership of the RPA, such holder shall, within 30 days, notify the Director General of such transfer on the appropriate form.



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## 18.3 PERSONNEL LICENSING

### 18.3.1 General

- (a) No person shall act as pilot of an RPA, except when undergoing a skill test or receiving flight instruction, unless he or she is in possession of a valid Remote Pilot Licence (RPL) in the relevant category.
- (b) A Remote Pilot Licence may be issued for the following categories:
  - (1) RPL (A): Aeroplane Remote Pilot Licence;
  - (2) RPL (H): Helicopter Remote Pilot Licence;
  - (3) RPL (MR): Multicopter Remote Pilot Licence.
- (c) The following ratings may be endorsed on the licence:
  - (1) VLOS: visual line of sight operations;
  - (2) E-VLOS: extended visual line of sight operations;
  - (3) B-VLOS: beyond visual line of sight operations;

### 18.3.2 Requirements for the issue of an RPL

- (a) An applicant for an RPL shall:
  - (1) be not less than 18 years of age;
    - (i) hold at least a valid Class 4 medical certificate for B-VLOS operations or operations involving RPAS classified as class 3 or higher; or
    - (ii) for all other classes or types of operation, submit a medical assessment report for operations involving RPAS classified as class 2 or lower: provided that an applicant who cannot meet the requirements of the medical assessment shall submit a Class 4 medical certificate. The report shall contain the information as prescribed in Document ZCARs Part 18;
  - (2) hold a restricted Certificate of Proficiency in Radiotelephony (Aeronautical);
  - (3) provide proof of the ability to speak the English language at proficiency level 4 or higher, as prescribed in Part 2 of the ZCARs;
  - (4) where required, have completed the flight training referred to in this Part;
  - (5) have passed the theoretical knowledge examination referred to in this Part; and
  - (6) have passed the skill test referred to in this Part.

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- (b) An application for an RPL shall be made to the Director General on the appropriate form within 30 days of completing the practical skill test.

### 18.3.3 Theoretical knowledge examination

- (a) The theoretical knowledge examination applicable to the category of licence sought shall be passed within ninety (90) days preceding the skill test.
- (b) The theoretical knowledge examination shall be conducted at a Zambian Civil Aviation Authority (ZCAA), Approved Training Organization (ATO), except as provided for in ZCARs Part 2.
- (c) The syllabi as well as other requirements for the examination shall be as prescribed in Document ZCARs PART 18 (ATO Certification Manual).
- (d) Approval shall be obtained from the Director General before any foreign theoretical training or theoretical knowledge examination is undertaken if such training or knowledge is to be accredited towards a Zambian RPL.

### 18.3.4 Flight training

- (a) The flight training syllabi for the different categories of licence shall be as prescribed in Document ZCARs PART 18.
- (b) The organisation conducting the training shall issue a certificate stating that flight training has been successfully completed.
- (c) All flight training shall be conducted with an aircraft of the same category for which the licence is sought.
- (d) Approval shall be obtained from the Director General before any foreign flight training is undertaken if such training is to be accredited towards a Zambian RPL.

### 18.3.5 Skill test

- (a) The skill test for an RPL shall be conducted within sixty (60) days of completing the flight training by an examiner approved by the ZCAA.
- (b) The skill test shall be conducted with an aircraft of the same category for which the licence is sought.
- (c) The holder of the RPL shall submit the skill test form to the ZCAA within thirty (30) days of the skill test.



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- (d) The skill test shall include the applicable sections for the E-VLOS and B-VLOS ratings if one or more of these ratings is sought.

### **18.3.6 Revalidation check**

- (a) An RPL is valid for one year from the date of issue.
- (b) A revalidation check shall be conducted by an examiner approved by the ZCAA in the sixty (60)-day period before the expiry date of the validity period. The revalidation shall be valid from the expiry date for a period of one year.
- (c) The revalidation check shall be conducted with an aircraft of the same category for which the licence is held.
- (d) If a revalidation check is completed more than sixty (60) days before expiry or within two (02) years after the expiry of an RPL, the RPL shall be re-issued from the date of the check for a one (01) year period.
- (e) The holder of the RPL shall submit the revalidation check form to the ZCAA within thirty (30) days of the revalidation check.

### **18.3.7 Pilot logbook**

- (a) The holder of a RPL shall maintain in a pilot logbook a record of all his or her flight time, instrument time, simulation time and instruction time.
- (b) Where electronic logbooks are used, the electronic data shall be printed on paper at least every ninety (90) days and the printed pages filed sequentially in a binder.
- (c) The pilot shall retain all pilot logbooks for at least five (5) years from the date that person no longer holds a valid pilot licence.
- (d) The holder of an RPL shall make the logbook available for inspection upon a reasonable request by an authorised officer, inspector or authorised person.

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## 18.4 RPAS OPERATOR CERTIFICATE

### 18.4.1 General requirements

- (a) No person shall operate an RPAS in terms of this Part unless such person is the holder of:
- (1) In the case of commercial, corporate and non-profit operations, a valid ROC including the operations specifications attached thereto; and
  - (2) in the case of commercial operations, an Air Services Permit issued in terms of the Civil Aviation Act No 5 of 2016.

### 18.4.2 Application

- (a) An application for the issuance of an ROC or renewal or an amendment thereto, shall be:
- (1) made to the Director General on the appropriate form; accompanied by :
    - (i) the appropriate prescribed fee.
    - (ii) a copy of the certificate of registration of each RPA to be operated;
    - (iii) a copy of the RLA for each device to be operated; and
    - (iv) for an initial issue, an original Operations Manual prepared as prescribed in this Part.
  - (b) No RPA shall be registered under more than one ROC.

### 18.4.3 Validity

- (a) An ROC shall be valid for one (01) year unless –
- (1) it is surrendered by the holder thereof; or
  - (2) it is suspended by an authorised officer, inspector or authorised person or revoked by the Director General.
  - (3) The holder of an ROC shall, at least sixty (60) days immediately preceding the date on which such certificate expires, apply for the renewal of such certificate.
  - (4) The holder of an ROC which has been revoked shall, within seven (07) days of the date revocation, surrender such document to the Director General.

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#### 18.4.4 Duties of the holder of an ROC

- (a) The holder of an ROC shall –
- (1) conduct the activities granted by such certificate and ensure compliance with the provisions authorized therein;
  - (2) ensure compliance with any other requirements which the Director General may impose; and
  - (3) report to the Director General any changes directly or indirectly related to the ROC that may affect continued validity of the certificate or approval or safety of persons and property.
- (b) For operations approved for E-VLOS, the operator shall –
- (1) make use of at least one observer who shall not be younger than eighteen (18) years of age; and
  - (2) ensure that each observer has completed the training prescribed by the operator and as approved by the Director General in their Operations Manual.
- (c) The holder of an ROC is accountable for the overall operation.

#### 18.4.5 Operations Manual

- (a) An ROC holder shall develop for approval by the Director General, an Operations Manual containing all the information required to demonstrate how such operator will ensure compliance with the regulations and how safety standards will be applied and achieved during such operations.
- (b) An ROC holder shall set out the type and scope of operations, including the manner in which each type of RPAS and operation will be safely conducted.
- (c) The Operations Manual, or system of manuals, should reflect all operational and legislative activities and obligations which the ROC holder is obliged to meet, such that the content is commensurate with the size and scope of the operation.
- (d) The operator shall submit amendments to the Director General for approval –
- (1) prior to a change in any proposed aspect, type or scope of the operator's operation;
  - (2) where the Operations Manual no longer meets the requirements of these regulations or associated technical standards;
  - (3) on determining that any part or component thereof is, or becomes, inadequate; or

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(4) as required by the Director General.

- (e) Upon the approval of the Operations Manual amendments by the Director General, the operator shall make such changes available to all persons engaged in the operation, deployment, handling, security, transportation and storage of any RPAS operated by such ROC holder and ensure that they are made aware, and where necessary trained in accordance with any relevant aspect relating to such amendment.
- (f) The structure and contents of the Operations Manual shall be as prescribed in Document ZCARs PART 18.

#### 18.4.6 Documentation and Records

- (a) An RPAS operator shall establish a system of record-keeping that allows adequate storage and reliable traceability of all activities developed, covering in particular:
- (1) lines of responsibility and accountability;
  - (2) Safety Policy;
  - (3) identification of aviation safety hazards encountered by the activities of the operator, assessment and mitigation of the associated risks, including taking actions and verifying their effectiveness;
  - (4) personnel training and competence; and
  - (5) quality, safety and security management records.
- (b) The format of the records shall be specified in the ROC holder's Operations Manual.
- (c) Records shall be stored for at least 5 years in a manner that ensures protection from damage, alteration and theft.

#### 18.4.7 Security

- (a) The holder of an ROC issued under this Part shall:
- (1) conduct background checks on all personnel recruited for deployment, handling, transportation and storage of any RPAS;
  - (2) conduct criminal record checks every two (02) years on all personnel employed in the deployment, handling, and storage of RPAS;
  - (3) ensure that RPAS not in use are stored in a secure manner to prevent and detect unauthorized interference or use;
  - (4) ensure that the RPAS is protected from acts of unlawful interference;

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- (5) ensure that the RPA is stored and prepared for flight in a manner that will prevent and detect tampering and ensure the integrity of vital systems;
- (6) designate a security coordinator responsible for the implementation, application and supervision of the security controls; and
- (7) ensure that all personnel employed in the deployment, handling, and storage of RPAS have received security awareness training as prescribed in ZCARs Part 9.

- (b) The holder of a ROC shall include in the Operations Manual referred to in regulation 4.5 the security aspects of the RPA operations as prescribed in this regulation and Document ZCARs Part 18

#### **18.4.8 Surveillance, Safety and Security Audits and Inspections**

- (a) An applicant for the issuance of an ROC shall permit an authorized officer, inspector or authorized person to carry out such safety and security inspections, audits and oversight as may be necessary to verify the validity of any application made in terms of regulation 4.2.
- (b) The holder of an ROC issued in terms of regulation 4.2, shall permit a person authorized by the Director General to carry out such safety and security inspections, audits and oversight, including safety or security inspections and audits of its partners or subcontractors, as may be necessary to determine continued compliance with the provisions of regulations and the privileges granted by the certificate.

#### **18.4.9 Register of Operating Certificates**

The Director General shall maintain a register of all certificates issued in terms of this Part.

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**18.4.10 Transferability**

An ROC issued in terms of this Part shall not be transferable.

**18.4.11 Insurance**

An ROC holder shall at all times be adequately insured for third party liability.



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## 18.5 RPA OPERATIONS

### 18.5.1 Weather conditions

- (a) No person shall operate an RPAS in weather conditions that do not allow unobstructed visual contact to be maintained with the RPA by other airspace users and by the operator unless in B-VLOS or night operations approved by the Director General in their Operations Manual.

### 18.5.2 Landing on Roads

- (a) No person shall use a public road as a place of landing or take-off of an RPA, except when involved in civil defense or law-enforcement operations and provided that at all times reasonable care is taken to ensure the safety of persons and property on the ground.

### 18.5.3 Controlled Airspace

- (a) No RPAS may be operated in controlled airspace, except by the holder of an ROC and as approved by the Director General in the operator's Operations Manual.
- (b) The Director General may approve an RPA operation in controlled airspace as contemplated in regulation (1) only in –
- (1) Visual Meteorological Conditions (VMC) in an Aerodrome Traffic Zone (ATZ) and Control Zone (CTR) below 400ft; and
  - (2) subject to compliance with the conditions prescribed in Document ZCARs PART 18.

### 18.5.4 Releasing Object or Substance

- (a) No object or substance shall be released, dispensed, dropped, delivered or deployed from an RPA except by the holder of an ROC and as approved by the Director General in the operator's Operations Manual.

### 18.5.5 Dangerous Goods

- (a) Subject to regulation (2), no RPA shall carry dangerous goods as cargo, except by the holder of an ROC and as approved by the Director General in the Operations Manual.
- (b) The provisions of ZCARs Part 9 apply, with the necessary changes, to the conveyance of dangerous goods by an RPA.

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### 18.5.6 Accidents and Incidents

- (a) All accidents and incidents involving an RPA shall be reported as prescribed in ZCARs Part 8, where there is –
- (1) any injury to a person;
  - (2) damage to property; or
  - (3) destruction of the RPA beyond economical repair.

### 18.5.7 Consumption of Alcohol and Drugs

- (a) No RPA pilot, observer or RPAS Maintenance Technician (RMT) shall:
- (1) consume alcohol less than 8 hours prior to reporting for duty;
  - (2) commence a duty period while the concentration of alcohol in any specimen of blood taken from any part of his or her body is more than 0.02 grams per 100 milliliters;
  - (3) consume alcohol or any psychoactive substance during the duty period or whilst on standby for duty; or
  - (4) commence duty period while under the influence of alcohol or any psychoactive substance having a narcotic effect.

### 18.5.8 Command and Control Link (C2) Operational Requirements

- (a) An RPAS shall comply with C2 operational requirements as prescribed in Document ZCARs PART 18

### 18.5.9 Precautions and Safety Considerations

- (a) No person shall operate an RPAS unless –
- (1) the RPA is in a fit-to-fly condition;
  - (2) the pilot is the holder of a licence issued in terms of this Part;
  - (3) the remotely piloted aircraft station is compatible and interoperable with the aircraft it is connected to in all phases of flight; and
  - (4) the RPA is being controlled by only one RPS at any given moment in time.
- (b) No person shall operate an RPA in a negligent or reckless manner so as to endanger the safety of any person, property or other aircraft in the air or on the ground.
- (c) The operator shall, in the best interest of safety, ensure that certain RPA operations are supplemented with additional personnel for non-flying duties, such that the RPA pilot



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can maintain control and situational awareness in respect to positioning and collision avoidance.

### 18.5.10 General Restrictions

- (a) No person shall operate an RPA unless they have in their possession:
  - (1) a valid RPA Pilot Licence;
  - (2) a copy of the ROC and associated OpSpec;
  - (3) the certificate of registration for each RPA in operation;
  - (4) a copy of the RLA; and
  - (5) user manual for the RPA and the remote pilot station.
- (b) No RPA shall:
  - (1) tow another aircraft;
  - (2) perform aerial or aerobatic displays;
  - (3) be flown in formation or swarm;
  - (4) be flown adjacent to or above a nuclear power plant, prison, police station, crime scene, court of law, national key point or strategic installation.
- (c) Except by the holder of an ROC, and as approved by the Director General, no RPA shall be operated –
  - (1) above 400 ft above the surface;
  - (2) within a radius of 10 km from an aerodrome; and
  - (3) within restricted or prohibited airspace.

### 18.5.11 Beyond Visual Line-Of-Sight (B-VILOS)

- (a) An RPA shall not be flown beyond visual-line-of-sight (B-VLOS) unless by the holder of an ROC and as approved by the Director General in the Operator's Operations Manual.
- (b) The Director General may approve B-VLOS operation subject to the operator meeting the requirements prescribed in Document ZCARs PART 18.
- (c) Approved B-VLOS operations may only be conducted in VMC, below 400ft above ground level, unless otherwise approved by the Director General.

### 18.5.12 Night Operations

- (a) An RPA may not be flown at night except –
  - (1) in R-VLOS operation; or

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(2) by the holder of an ROC, and as approved by the Director General in terms of regulation (2).

(b) The holder of an ROC intending to operate an RPA at night, shall, as a minimum have each RPA approved under their ROC for night operations subject to compliance with the requirements prescribed in Documents ZCARs PART 18.

(c) An RPA may not be flown at night in controlled airspace except as approved by the Director General as prescribed in regulation 5.3.

#### **18.5.13 Operations in the Vicinity of People**

(a) No person shall operate an RPA directly overhead any person or group of people or within a lateral distance of 50 m from any person, unless:

- (1) the operator is the holder of an ROC and the operation has been approved by the Director General in their Operations Manual; or
- (2) such person is the operator of the RPA or such person is under the direction of the operator of the RPA; or
- (3) such person or group of people forms part of the operations of the RPA, and is under control of the operator of the RPA, and adequate provisions have been made for their safety.

#### **18.5.14 Operations in the Vicinity of Property, Structures and Buildings**

(a) No RPA shall be flown within a lateral distance of 50 m from any structure or building, unless:

- (1) the operator is a holder of an ROC and the operation has been approved by the Director General in their Operations Manual; or
- (2) permission is obtained from the owner of such structure or building.

(b) An operator conducting an operation as contemplated in regulation (1) shall take such measures as are necessary to ensure the safety of all persons on the ground accessing such building or in the vicinity of such structure.

#### **18.5.15 Operations in the Vicinity of Public Roads**

(a) No person shall operate an RPA over a public road, along the length of a public road or at a distance of less than 50 m from a public road unless:

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- (1) such person is the holder of an ROC and the operation has been approved by the Director General in the operator's Operations Manual; or
- (2) in the case of operations over a public road, such road has been closed for public use; and
- (3) reasonable care has been taken to ensure the safety of road users and pedestrians in the event of loss of control of the RPA.

#### **18.5.16 Radio Communication Requirements**

- (a) Except for R-VLOS operations, no RPA shall be operated unless the RPA pilot has a functioning air-band radio in his possession, tuned to the frequency or frequencies applicable to the ATC providing services or controlling such area or airspace or to aircraft in such area or airspace.
- (b) The air-band radio shall have the required output and be configured in such a way that the range, strength of transmission and quality of communication extends beyond the furthest likely position of the RPA from the RPA pilot.
- (c) For VLOS, E-VLOS and B-VLOS operations, the RPA pilot shall, using the registration of the RPA as a call-sign, make the required radio calls, indicating the altitude, location and intended operation of the RPA in that area and at such intervals as are required in order to ensure adequate separation from other aircraft is maintained.
- (d) For approved RPA operations in controlled airspace, the RPA pilot shall maintain radio contact, using the registration of the RPA as a call-sign, with the relevant ATC, and acknowledge and execute such instructions as the ATC may give at any time during the operation of the RPA.

#### **18.5.17 Pre-Flight Preparation**

- (a) An RPA pilot shall complete the pre-flight preparations prior to each flight, as prescribed in Document ZCARs PART 18

#### **18.5.18 Duties of Pilot**

- (a) The pilot is accountable for safe operation of the RPAS.
- (b) The pilot of an RPA shall, on each flight, operate such aircraft in accordance with the manual, unless an unforeseen emergency dictates otherwise.

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- (c) The pilot of an RPA is responsible for separation and avoidance of the RPA from other aircraft and any other obstacles and hazards.
- (d) The pilot of an RPA shall pilot such RPA in a manner so as to minimize hazards to persons and property on the ground, and other aircraft in the air.
- (e) The pilot shall ensure that at least one observer is used for E-VLOS operations.

#### 18.5.19 Flight Operations

- (a) The RPAS shall be operated in such a way that appropriate separation from other aircraft is maintained and that adequate obstacle clearance is ensured, during all phases of the flight.
- (b) The pilot of an RPA shall ensure that the take-off and landing area is safe and of the appropriate dimensions, free from obstacles and has adequate surface conditions, with regard to the type of operation, the size of the aircraft, the aircraft's performance and external factors.

#### 18.5.20 Right of Way

- (a) An RPA shall give way to manned aircraft.
- (b) The RPA shall avoid passing over, under or in front of manned aircraft, unless it passes well clear and takes into account the effect of aircraft wake turbulence.
- (c) When two aircraft are approaching head-on or approximately so and there is danger of collision, each aircraft shall alter its heading to the right.
- (d) When two aircraft are converging at approximately the same level, the aircraft which has the other aircraft on its right, shall give way.
- (e) An aircraft which is being overtaken has the right-of-way, and the one overtaking shall alter its heading to keep well clear

#### 18.5.21 Use of Time

- (a) For the purposes of reporting and recording time, Co-ordinated Universal Time (UTC) shall be used and shall be expressed in hours and minutes and, when required, seconds of the 24-hour day beginning at midnight.
- (b) A time check shall be obtained from air traffic control, if possible, prior to operating a controlled flight and at such other times during the flight as may be necessary.
- (c) Wherever time is utilized in the application of data link communications, it shall be accurate to within 1 second of UTC.

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### 18.5.22 Flight Log Book

- (a) The owner or operator of a Zambian registered RPA shall ensure that the RPA has a flight log book or any other similar document which meets the requirements of and contains the information as prescribed in ZCARs Part 8 and the flight log book shall be accessible at the remote pilot station at all times during flight.
- (b) The flight log book shall be kept up-to-date and maintained in a legible manner by the Remote Pilot in Command (RPIC).
- (c) All entries shall be made immediately upon completion of the occurrence to which they refer.
- (d) In the case of maintenance being undertaken on the aircraft, the entry shall be certified by the person taking responsibility for the maintenance performed.

### 18.5.23 Fuel, Oil and Charging Records

- (a) The owner or operator shall maintain fuel or charging records to enable the Director General to ascertain that, for each flight under his or her control, the requirements of regulations (4) and (5) of this regulation are complied with.
- (b) The remote pilot of the aircraft shall enter the fuel, charging and oil records referred to in regulation (1) in the flight log book.
- (c) The owner or operator shall maintain oil records to enable the Director General to ascertain that trends for oil consumption are such that an aircraft has sufficient oil to complete each flight.
- (d) During VLOS operations, the remote pilot shall ensure that the aircraft has enough fuel or electrical charge to return to the point of landing, complete a landing and then fly for at least two minutes.
- (e) During B-VLOS operations, the remote pilot shall ensure that the aircraft has enough fuel or electrical charge to complete the intended flight plus a reserve of twenty percent (20%)

### 18.5.24 First Aid Kit

- (a) No owner or operator of an RPA shall operate the aircraft unless a First Aid Kit consisting of the medical supplies as prescribed in ZCARs Part 8 for manned aircraft is available within the remote pilot station and within three hundred (300) m of the takeoff and landing points. A single kit may be used to comply with these requirements.

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- (b) The owner or operator shall carry out periodical inspections of the First Aid Kit to ensure that, as far as practicable, the contents thereof are in a condition necessary for their intended use.
- (c) The contents of the first aid kit shall be replenished at regular intervals, in accordance with instructions contained on their labels, or as circumstances require.
- (d) The First Aid Kit shall be readily accessible to all crew members involved in the operation.

### 18.5.25 Hand-Held Fire Extinguishers

- (a) No owner or operator of an RPA shall operate the RPA unless –
  - (1) a hand-held fire extinguisher is available in the remote pilot station and within 300 m of the takeoff and landing points;
  - (2) a hand-held fire extinguisher suitable for use with electronic equipment and any power generating equipment in use is available in the remote pilot station; and
  - (3) a hand-held fire extinguisher suitable for use on the RPA is available within 300 m of the takeoff and landing points.

## 18.6 MAINTENANCE

### 18.6.1 Continued System Maintenance

- (a) An RPAS shall be compliant with the manufacturer’s instructions for continued equipment maintenance through actions or inspections.

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- (b) The owner shall submit to the Director General for approval, a maintenance programme for the RPAS.

### 18.6.2 RPAS Maintenance

- (a) The maintenance on an RPA or any component thereof shall be carried out by the following persons:
- (1) In respect of an RPA classified as a Class 3 and higher, the holder of a valid RMT Approval; or
  - (2) In respect of an RPA classified as Class 2 and lower, the ROC holder: provided that the holder can demonstrate to the satisfaction of the Director General, its ability to perform the required maintenance on the RPA.

### 18.6.3 Issuance of an RMT Approval

- (a) An applicant for the issuance or renewal of an RMT Approval shall –
- (1) be not less than 18 years of age; and
  - (2) be a Zambian citizen or in possession of a valid permanent residence permit or valid temporary work permit with a letter of employment; and
  - (3) shall have successfully completed appropriate training, provided by –
    - (i) an organisation approved by the competent authority in the country where the training organisation is located;
    - (ii)
  - (4) Demonstrate the ability to perform maintenance functions to the Director General where no training for the particular RPA is offered or available.
- (b) An application for the issuance of an RMT Approval shall be made to the Director General in the appropriate form and accompanied by the appropriate prescribed fee.
- (c) The Director General shall issue an RMT Approval if the applicant complies with the requirements prescribed in ZCARs Part 2.
- (d) The holder of an RMT Approval shall not exercise privileges other than the specific privileges for which the Approval is issued.
- (e) An RMT Approval shall be valid for a period of one (01) year.

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**18.6.4 RMT Log Book**

- (a) Any person responsible for maintenance of RPAS shall maintain a personal logbook and shall record therein all work carried out on an RPAS and its components.
- (b) The form of and information to be contained in a logbook referred to in sub- regulation (1), and the manner in which such logbook shall be maintained, are as prescribed in Document ZCARs PART 18.
- (c) No alterations of a logbook shall be made once it is signed off by a designated person.





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## SCHEDULES

### SCHEDULE 1: LIST OF TECHNICAL STANDARDS: REMOTELY PILOTED AIRCRAFT SYSTEMS

#### 18.1.5 GROUPING AND CLASSIFICATION

#### 18.1.7 RPA SALE AND RE-SALE LABELLING

#### 18.2.2 RPAS SYSTEM SAFETY

#### 18.2.4 REGISTRATION AND MARKING

1. Allocation of marks
2. Identification plate
3. Display of marks
4. Location of marks
5. Specification of marks
6. Measurement of marks

#### 18.3.3 THEORETICAL KNOWLEDGE EXAMINATION

1. General
2. Items applicable to the remote pilot general examination
3. Items applicable to all remote pilot licenses
4. Items applicable to the Remote Pilot licenses (Aero plane)
5. Items applicable to the helicopter remote pilot licenses (RPL (H))
6. Items applicable to the Remote Pilot licence (Multirotor)(RPL(MR))

#### 18.3.4 FLIGHT TRAINING

1. General
2. Items applicable to all Remote Pilot licenses
3. Items applicable to the Remote Pilot licence (Aero plane)(RPL(A))
4. Items applicable to the Remote Pilot licence (Helicopter)RPL(H))
5. Items applicable to the Remote Pilot licence (RPL(MR))

#### 18.4.5 OPERATIONS MANUAL

#### 18.5.3 CONTROLLED AIRSPACE

#### 18.5.8 C2 OPERATIONAL REQUIREMENTS

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[18.5.11 BEYOND VISUAL-LINE-OF-SIGHT](#)

[18.5.12 NIGHT OPERATIONS](#)

[18.5.17 PRE-FLIGHT PREPARATION](#)

[18.6.5 RMT LOGBOOK](#)



## 18.1.5 GROUPINGS AND CLASSIFICATIONS

| <u>Class</u>    | <u>Table 1: RPAS Classification</u> | <u>line-of-sight</u>  | <u>Kinetic energy*<br/>(kJ)</u> | <u>Height<br/>(AGL)(ft)</u> | <u>MTOM (kg)</u> |
|-----------------|-------------------------------------|-----------------------|---------------------------------|-----------------------------|------------------|
| <u>Class 1A</u> | R-VLOS/VLOS/E-VLOS/                 | A                     | $h < 400$                       | $m < 1.5$                   |                  |
| <u>Class 1B</u> | R-VLOS/VLOS/E-VLOS/                 | $E_k < 15$            | $h < 400$                       | $m < 7$                     |                  |
| <u>Class 1C</u> | R-VLOS/VLOS/E-VLOS/                 | $15 < E_k < 34$       | $h < 400$                       | $m < 20$                    |                  |
| <u>Class 2A</u> | VLOS                                | $E_k > 34$            | $h < 400$                       | $m < 20$                    |                  |
| <u>Class 2B</u> |                                     | Experimental/Research |                                 |                             |                  |
| <u>Class 3A</u> | RLOS                                | $E_k > 34$            | $h < 400$                       | $m < 150$                   |                  |
| <u>Class 3B</u> | VLOS                                | Any                   | $h > 400$                       | $m < 150$                   |                  |
| <u>Class 4A</u> | RLOS                                | Any                   | $h > 400$                       | $m < 150$                   |                  |
| <u>Class 4B</u> | Any                                 | Any                   | Any                             | $m > 150$                   |                  |
| <u>Class 5</u>  | Reserved                            | Reserved              | Reserved                        | Reserved                    |                  |

Reserved - means to be defined in the future

H - means height above the surface

$$E_k = 1/2 * \text{Mass} * (1.4v_{\max})^2$$

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## **18.1.7 RPA SALES OR RE-SALES LABELING**

On the sale or re-sale of any RPA, the seller shall display and insert a notice, to notify the purchaser of the following information. Such notice should, as a minimum include the follows:

*“Note: The operation of Remotely Piloted Aircraft (RPA) is regulated in terms of the Zambian Civil Aviation Requirements.*

*Operations as a hobbyist are subject to the terms of ZCARs Part 19 whereas private use is restricted in terms of Regulation 1.4 of the RPAS Regulations.*

*For private use –*

- (a) The RPAS may only be used for an individual’s personal and private purposes where there is no commercial outcome, interest or gain;*
- (b) The RPA may only be operated over property for which the operator has ownership or permission;*
- (c) The RPAS can only be used in Restricted Visual Line of Sight which means within 500m of the pilot, and never to exceed the height of the highest obstacle within 300m of the pilot, during which the pilot can maintain direct unaided visual contact with the device to manage its flight and collision avoidance; and*
- (d) The pilot shall observe all statutory requirements relating to liability, privacy and any other laws enforceable by any other authorities.*

*For any other use –*

- (a) the RPA shall first be approved by the Zambian Civil Aviation Authority for use by way of an RPA Letter of Approval (RLA);*
- (b) all RPAs shall be registered by the Zambian Civil Aviation Authority prior to use;*
- (c) an RPA may only be operated in terms of Part 18 of the Zambian Civil Aviation Requirements which includes specific requirements that the operator shall hold an RPA Pilot License; and*
- (d) no RPA may be sold to any person under the age of 18.*

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### **18.2.2 RPAS SYSTEM SAFETY**

(a) An application for an initial approval, where no certification exists from an ICAO Contracting state shall be accompanied by all of the following information that is available from the manufacturer:

- (1) The RPAS Operating Manual from the manufacturer;
- (2) A submission, prepared by the applicant outlining all of the following information to the extent known, or available:
  - (i) For Class 1 and Class 2 operations, *only sections 1 and 2 below;*
  - (ii) For Class 3, Class 4 and Class 5 *all sections below:*

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## Section 1 – RPAS Information

- 1.1 RPAS type
- 1.2 RPA structure
- 1.3 RPA composition
- 1.4 flight envelope capability
- 1.5 RPA dimensions/measurements and mass together with drawings
- 1.6 mass and balance information

## Section 2 - Performance Characteristics

- 2.1 maximum altitude
- 2.2 maximum endurance
- 2.3 maximum range
- 2.4 Airspeed (take-off, cruise, landing, stall, maximum)
- 2.5 maximum rate of climb
- 2.6 maximum rate of descent
- 2.7 maximum bank angle
- 2.8 turn rate limits

## Section 3 – Performance Capabilities and Limitations

- 3.1 RPA performance limitations due to environmental and meteorological conditions (wind, ice, humidity, temperature, precipitation, hail)
- 3.2 required take-off and landing distances and/or areas
- 3.3 power type
- 3.4 propulsion system (such as engine/motor, fuel, electrical, hydraulic, pneumatic, gas, solar)
- 3.5 flight control surfaces and actuators

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- 3.6 payloads (specific or generic)
- 3.7 location of all air data sensors, antennas, radios, and navigation equipment with respect to segregation and redundancy
- 3.8 autopilot (type, manufacturer, description of working method)
- 3.9 navigation systems (description of the components, together with horizontal, vertical position and velocity accuracy)
- 3.10 use of frequencies
- 3.11 sensors and/or telemetry
- 3.12 flight recovery system
- 3.13 remote pilot station
- 3.14 ground support equipment
- 3.15 surveillance equipment

#### Section 4 – Emergencies & System Failures

- 4.1 At the minimum, the following emergency scenarios should be documented, with procedures for handling them:
- (a) loss of autopilot (fatal error)
  - (b) loss of flight control due to servo failure, if applicable
  - (c) loss of propulsion power
  - (d) loss of engine power (one engine out), if applicable
  - (e) low battery voltage, if applicable
  - (f) loss of navigation components (heading or altitude)
  - (g) loss of Global Navigation Satellite System
  - (h) loss of data link (radio control link failure)
  - (i) loss of remote pilot station (remote pilot station communication failure)
  - (j) loss of power of remote pilot station
  - (k) loss of remote pilot/RPA observer communication
  - (l) dealing with structural damage
  - (m) any other failure modes or scenarios other than those listed above that can endanger safe flight, shall be identified, described and managed in appropriate manner.

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### **Section 5 – Hazard Assessment**

An objective assessment of the RPAS’s potential hazard considerations, which should include:

- (a) Identification of RPAS functions
- (b) Systems that assist with the identification of failure conditions
- (c) Management and mitigations of the failure conditions
- (d) A list of alarms and methods for troubleshooting

### **Section 6 – Fail-Safe Features**

Procedures to be followed by the remote pilot in case of malfunctions or failure.

Information of flight termination features.



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## 18.2.4 REGISTRATION AND MARKING

### (a) Identification plate

- (1) Every Zambian-registered RPA shall have affixed to it an identification plate (engraved, stamped or etched) with its nationality and registration marks.
- (2) The identification plate shall–
  - (i) be made of fireproof material of suitable physical properties;
  - (ii) be affixed to the RPA in a prominent position; and
  - (iii) include the registration mark issued by the authority which appears on the RPA's certificate of registration

### (b) Display of marks

- (1) The nationality and registration marks shall be –
  - (i) affixed to the RPA by an appropriate means so as to ensure that such marking will not become detached from the RPA in the event of an accident or destruction of the RPA;
  - (ii) legible;
  - (iii) displayed to the best possible advantage having regard to the construction or features of the RPA; and
  - (iv) kept clean and visible at all times.
- (2) The registration mark letters and hyphen shall be printed/painted in Roman characters, in black on a white background. The height of the white background shall be at least 120% of the font height.
- (3) The size of the registration mark shall be commensurate to the size of the RPA

### (c) Location of marks

- (1) The marks on a fixed wing RPA shall appear –
  - (i) on the bottom and top surface of each wing; and
  - (ii) on both sides of the fuselage between the wings and tail surfaces, or on the upper halves of the vertical tail surfaces
- (2) The marks on a single or multi-rotor RPA shall appear –
  - (i) For spherical RPA the marks shall be proportional to the surface area in two places diametrically opposite one another.

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(ii) For non-spherical RPA the marks shall be proportional to the surface on each side.

**(d) Allocation and specification of marks**

- (1) The Zambian nationality marks are the number 9 and the capital letter J (9J).
- (2) The nationality and registration marks shall consist of capital letters in Roman characters without ornamentation. 9J – X.....
- (3) The width of each letter (except letter “I”) and the length of the hyphen shall be two-thirds of the height of the letter – where possible.
- (4) Each letter shall be separated from the letter which immediately precedes or follows it by a space equal to one-third the height of the individual letters, the hyphen being regarded as a letter for this purpose.
- (5) The lines forming the letters and hyphen shall be solid and the thickness of those lines shall be one-sixth of the height of the letter.

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### 18.3.3 THEORETICAL KNOWLEDGE EXAMINATION

#### (a) General

- (1) The subjects and items relevant to the different categories of licence (aeroplane, helicopter and multirotor) are specified below.
- (2) Rewrite after failure
  - (i) A candidate may not apply to rewrite an examination until he or she has received the official result notification.
  - (ii) A candidate who has failed an examination conducted by the Authority for the issue of a flight crew licence or rating may not rewrite the examination:
    - (A) in the case of a first or second failure, within a period of 7 calendar days;
    - (B) in the case of a third or subsequent failure, within a period of 2 calendar months;
    - (C) where a mark of less than 50% was achieved, within a period of 2 calendar months.
  - (iii) If a mark of less than 50% is achieved in conjunction with a third or subsequent failure, the respective periods of 2 calendar months shall run concurrently.
- (3) Re-mark after failure
  - (i) A candidate who fails an examination with a mark of 65% or above may, within 30 days from the date of notification of the examination results, apply in writing for a re-mark.
  - (ii) The application shall be accompanied by the appropriate prescribed fee.
  - (iii) If the re-mark results in a pass of the examination concerned, the re-marking fee will be refunded.
  - (iv) A candidate may not rewrite any examination in respect of which a re-mark has been requested and for which he or she has not been notified of the official result. Failure to comply with this condition will result in the premature re-write being invalidated and the applicable examination fee forfeited.

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(4) Remote pilot basic examination

- (i) This examination shall be passed before the first licence examination may be written.
- (ii) The examination is not required for any subsequent licence examinations.

(5) Licence examinations:

- (i) Remote Pilot Licence (Aeroplane).
- (ii) Remote Pilot Licence (Helicopter).
- (iii) Remote Pilot Licence (Multirotor).

**(b) Items applicable to the remote pilot basic examination**

(1) Air law for remotely piloted aircraft (RPA)

- (i) Zambian RPAS Regulations

(2) Human factors

Vision

- (i) Empty field myopia
- (ii) Adaptation to darkness
- (iii) Autokinesis.

Stress management

- (i) Causes of stress (stressors).

Meteorology

- (i) Factors affecting air density
- (ii) Fog and mist
- (iii) Wind and gusts
- (iv) Thunderstorms.
- (v) Aviation weather reports.

Navigation

- (i) Latitude and longitude

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(ii) Aeronautical chart information (VFR)

(iii) GPS

(A) Components of a GPS system as used on an RPA (5)

Lighting for remotely piloted aircraft.

**(c) Items applicable to all remote pilot licences**

(1) Construction and parts of the remotely piloted aircraft (RPA) (as applicable to the category of licence)

(2) Forces acting on an aircraft (as applicable to the category of licence)

(i) Weight

(ii) Lift

(iii) Drag

(iv) Thrust

(3) Axes of an aircraft and motion about the axes

(i) Lateral axis – pitch

(ii) Longitudinal axis – roll

(iii) Normal axis – yaw.

(4) Control of motion about the axes (as applicable to the category of licence)

(5) Propulsion systems (as applicable to the category of licence)

(i) Electric motors

(A) Brushed motors

(B) Brushless motors

(C) Motor ratings.

(ii) Electronic speed controllers

(iii) Petrol engines

(iv) Fuel mixtures

(v) Propellers

(A) Sizes (length and pitch).

(6) Weight and balance (as applicable to the category of licence)

(i) Dimensions and weight of aircraft

(ii) Arm, moment, reference datum, flight station, centre of gravity

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- (iii) Forward and aft limitations of Center of Gravity (CG).
- (7) Servo motors and servo actuators used in remotely piloted aircraft.
- (8) Radio control link
  - (i) Radio control transmitter and receiver
    - (A) Setup (as applicable to the category of licence).
  - (ii) Frequencies used.
- (9) Data link (C2 link)
  - (i) Airborne receiver
    - (A) Remote pilot station
      - i. Command and control functions
      - ii. Telemetry
      - iii. Detect and avoid uplink and downlink
      - iv. First person view (FPV)
      - v. Mission planner software
      - vi. Position and obstacle mapping
      - vii. Waypoint navigation.
      - viii. Frequencies used
      - ix. Setup.
- (10) Wireless links general
  - (i) Line-of-sight
    - (A) Fresnel zones
  - (ii) Interference
  - (iii) Coverage range
  - (iv) Antennas as used in remotely piloted aircraft systems.
- (11) Flight controller (autopilot system)
  - (i) Inputs and outputs
  - (ii) Inertial measurement unit (IMU)
  - (iii) Flight modes and facilities
  - (iv) Setup.
- (12) Batteries
  - (i) Sealed lead-acid (SLA)

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- (ii) Nickel-cadmium (NiCad)
- (iii) Nickel-metal hydride (NiMH)
- (iv) Lithium-ion (Li-Ion)
- (v) Lithium polymer (Li-Poly/LiPo)
- (vi) Charging of batteries.

(13) The functions and required actions of the RPA observer.

**(d) Items applicable to the Remote Pilot Licence (Aeroplane) (RPL(A))**

- (1) The stall
  - (i) Boundary layer
  - (ii) Stalling angle of attack
  - (iii) Aeroplane characteristics at the stall.

**(e) Items applicable to the helicopter remote pilot licence (RPL(H))**

- (1) Flight controls
  - (i) Collective control
  - (ii) Cyclic control
  - (iii) Anti-torque control.
- (2) Main and tail rotors.
- (3) Swash plate.
- (4) Rotor head
- (5) Rotor blade stall.
- (6) Fly bar.
- (7) Ground effect.
- (8) Helicopter setup.

**(f) Items applicable to the Remote Pilot Licence (Multirotor) (RPL(MR))**

- (1) Different configurations and frames.

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### 18.3.4 FLIGHT TRAINING

**(a) General**

Flight training can be a combination of simulator and aircraft training. The exercises need not be done in the sequence given.

**(b) Items applicable to all Remote Pilot Licences**

- (1) Aircraft preflight inspection and setup.
- (2) Post-launch in-flight evaluation procedures (checking of systems directly after launch- if applicable to the category of licence).
- (3) Automated flying and flight controller flight modes.
- (4) First person view (FPV) flying (if applicable).
- (5) Parachute-assisted landing (if applicable to the category of licence).
- (6) Evasive action (maneuvers) to avoid collisions.
- (7) Post-flight inspection.

**(c) Items applicable to the Remote Pilot Licence (Aero plane) (RPL(A))**

- (1) Climbing and descending.
- (2) Turns while maintaining altitude.
- (3) Climbing and descending turns.
- (4) Speed changes while maintaining altitude.
- (5) Horizontal figure eight.
- (6) Stalls.
- (7) Recovery from a spin.
- (8) Takeoffs.
- (9) Catapult launch (if applicable).
- (10) Hand launch (if applicable).
- (11) Approaches and landings.
- (12) Hand launching (if applicable).
- (13) Engine failure
  - (i) At altitude
  - (ii) After takeoff
  - (iii) On the approach.



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**(d) Items applicable to the Remote Pilot Licence (Helicopter) (RPL(H))**

- (1) Tail-in hover.
- (2) Tail-in hover performing squares and circles.
- (3) Takeoffs.
- (4) Tail-in hover performing a horizontal figure eight.
- (5) Tail-in hover performing a vertical rectangle.
- (6) Side-on hover (both sides)
- (7) Transition from hover to forward flight.
- (8) Transition from forward flight to hover.
- (9) Turns from level flight.
- (10) Climbing and descending from level flight.
- (11) Approach and landing.
- (12) Nose-in hover.
- (13) Autorotation.

**(e) Items applicable to the Remote Pilot Licence (RPL(MR))**

- (1) Tail-in hover.
- (2) Tail-in hover yawing slowly to right and left.
- (3) Tail-in hover, move to right then to the left.
- (4) Tail-in hover, move forwards then backwards.
- (5) Tail-in hover, ascend and descend.
- (6) Takeoffs.
- (7) Tail-in hover performing a horizontal rectangle.
- (8) Tail-in hover performing a vertical rectangle.
- (9) Nose-in hover.
- (10) From hover fly a square box rotating (yawing) the multirotor in the direction of flight.
- (11) From hover fly a circle rotating (yawing) the multirotor nose-in to the center of the circle.
- (12) Transition from hover to forward flight.
- (13) Climbing and descending from level flight.
- (14) Turns from level flight.

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- (15) Speed control in level flight.
- (16) Approach and landings.
- (17) Actions after failure of a motor.



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## 18.4.5 OPERATIONS MANUAL

Each ROC holder shall submit to the Director General for approval, an Operations Manual (OM), the content of which is commensurate with the size and scope of their intended operations. The content of the OM shall be in the following format –

### Part A: General

- (a) Administration & control
  - (1) Company information, address and contact details
  - (2) Table of Contents of Manual
  - (3) List of effective pages to control the version and revision of such OM
  - (4) Revision number
  - (5) Distribution list
  - (6) Definitions and Acronyms
  - (7) Statement of Compliance
- (b) Organization and operational control
  - (1) Organizational structure including an Organogram;
  - (2) Organizational responsibilities of post holders and designated persons;
  - (3) Responsibilities of support personnel;
  - (4) Technical description of each RPAS for intended use by the ROC holder;
  - (5) Area or scope of operation;
  - (6) Operating limitations and considerations required by the Director General;
  - (7) Operational Control Parameters;
  - (8) Accident prevention and safety programme;
  - (9) Flight crew qualifications and duties
  - (10) RPA Operations;
  - (11) Crew health
  - (12) Documents and Record keeping

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## Part B: Operating Procedures

### (a) Flight planning / preparation

- (1) Scope and feasibility
- (2) Site location assessment considerations:
  - (i) airspace considerations
  - (ii) conflicting aircraft or RPA traffic
  - (iii) hazards identification
  - (iv) local by-laws
  - (v) obstructions
  - (vi) restrictions
  - (vii) habitation and conflicting activities
  - (viii) public access
  - (ix) permission from landowner
  - (x) likely operating site and alternative sites
  - (xi) weather conditions and planning
- (3) Risk management - Identification of the hazards, risk assessment, mitigating procedures.
- (4) Communication procedures;
- (5) Notification of intended operations to affected persons;
- (6) Location and site permissions
- (7) Weather considerations

### (b) On site procedures & pre-flight checks

- (1) Site visual survey;
- (2) Selection of operating area;
- (3) Crew briefing
- (4) Cordoning off procedure (where applicable);
- (5) Communication range and capability requirements;
- (6) Weather observations;
- (7) Re-fuelling or recharging;
- (8) Loading of operational equipment;
- (9) Preparation and assembly of RPA on site;
- (10) Pre-flight and post flight checks

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(c) Flight procedure

- (1) Start
- (2) take-off
- (3) in flight
- (4) landing
- (5) shutdown

(d) Emergency procedure

- (1) Unique to the RPA to be operated;
- (2) Fire - Risk and preventative measures;
- (3) Accidents considerations and emergency response plan
- (4) Loss of control link
- (5) RPA - normal, abnormal and emergency procedures

**Part C: Training**

- (a) Details of the operator's training programme

**Part D: Safety and Security**

An operator shall ensure that policy and procedures in respect of the following aspects of security are addressed in its Operations Manual:

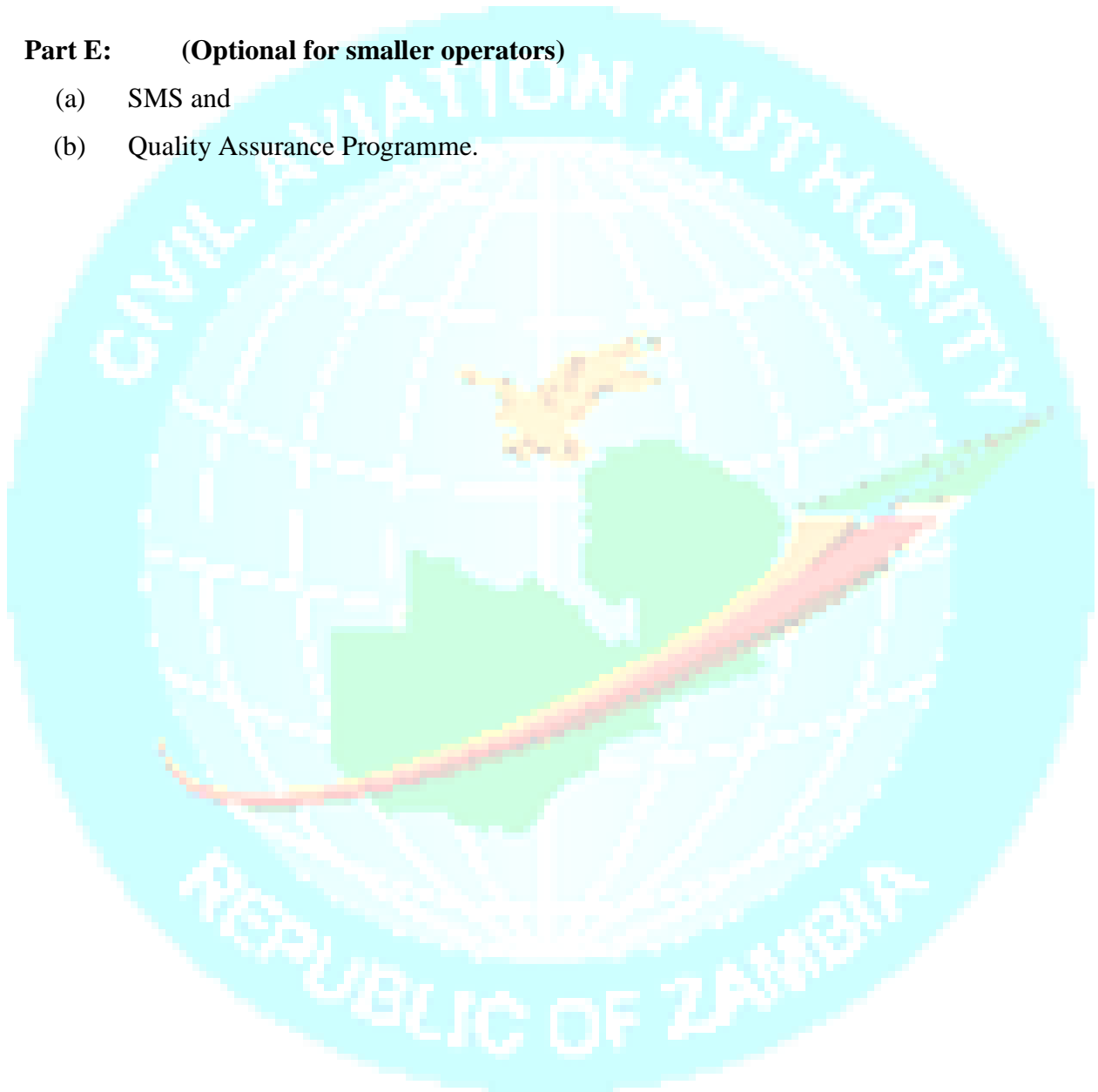
- (a) RPAS operator organization and designation of a security coordinator;
- (b) Requirements for checks and searches of specific areas and accessible compartments of the interior and exterior of RPAS;
- (c) Prevention of unauthorized access to remotely piloted aircraft and ground control stations;
- (d) Protection efforts pertaining to limiting the software and C2 links from forms of interference;
- (e) Response procedures for crew members and other staff for threats and incidents;
- (f) Special procedures for crop spraying operations, the carrying of weapons, dangerous goods, high consequence dangerous goods and high value cargo, if applicable;
- (g) Crew member briefings concerning security/safety sensitive cargo loads;
- (h) Additional security measures for special or more threatening situations

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- (i) Reporting of security related incidents to the authority;
- (j) Details on procedures and frequency on conducting background checks and recurrent criminal record checks; and
- (k) Details on security awareness and response procedure training

**Part E: (Optional for smaller operators)**

- (a) SMS and
- (b) Quality Assurance Programme.



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### 18.5.3 CONTROLLED AIRSPACE

(a) An RPA, intended for operations within an ATZ or CTR, shall as a minimum, meet the following technical requirements, which shall be serviceable and functioning for the duration of such proposed operation, the failure to any one of which shall require that such operations are terminated:

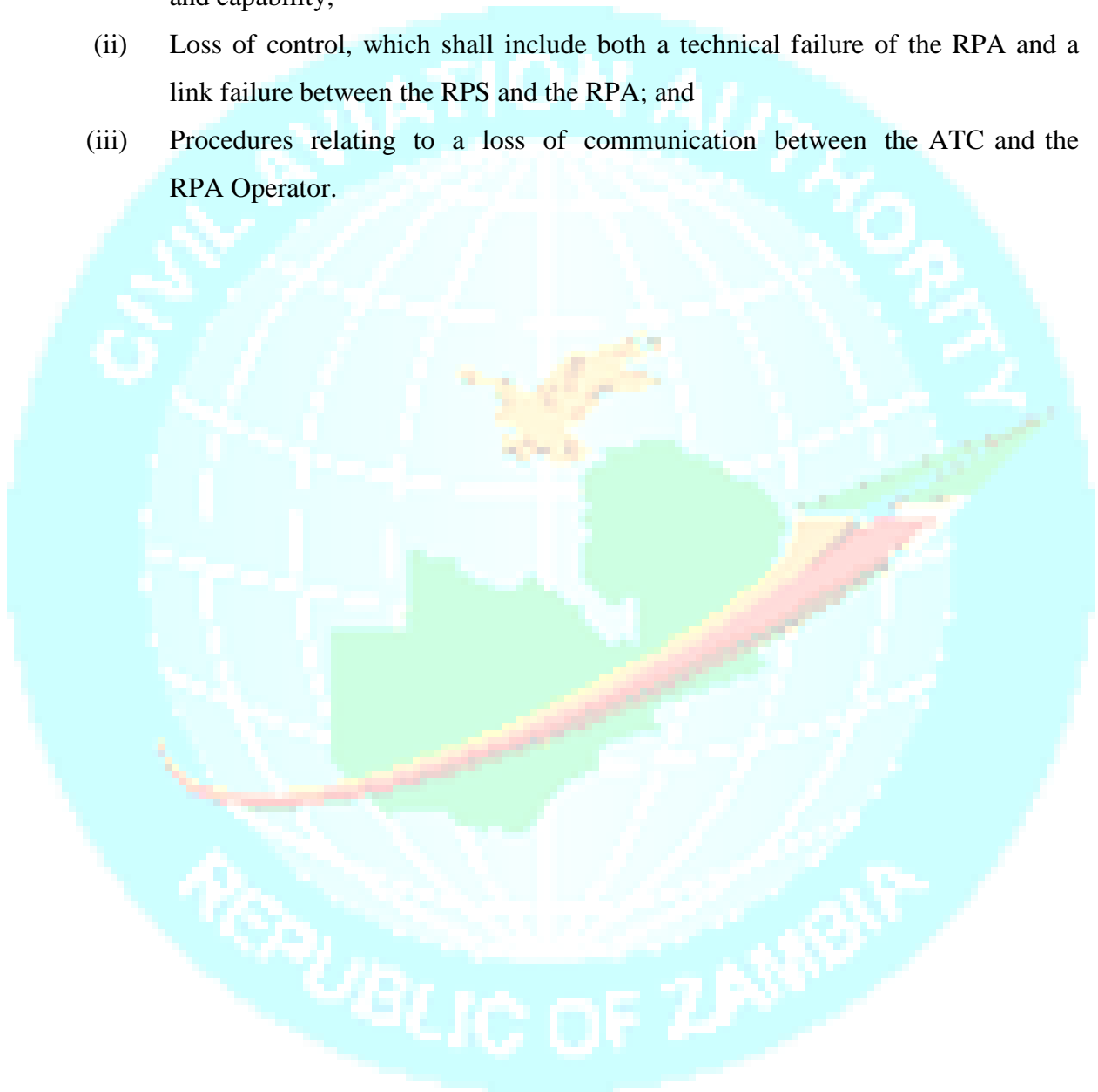
- (1) Be fitted with a mode C or S transponder capable of displaying the unique squawk code issued to them, unless otherwise exempted by the Director General and/or the applicable ATC according to an Flexible Use of Airspace (FUA) application;
- (2) Be fitted with an altimeter, capable of displaying to the operator on the RPS, the RPA's altitude above mean sea level, corrected for ambient pressure (QNH);
- (3) Be fitted with a functioning strobe light or lights, installed in such a way that such strobe lights are visible from both below and above the RPA; at all azimuth angles, and
- (4) In the instance of a fixed-wing RPA, be fitted with navigation lights.

(b) An ROC holder, who intends operating in an ATZ or CTR, shall as a minimum, meet the following operational requirements:

- (1) Include in its Operational Manual, details pertaining to such RPA operations under the ROC, detailing how the safety and separation measures for aircraft operating in the ATZ or CTR will be achieved;
- (2) Notify the relevant ATC in advance of such operations, outlining the intended type and scope of operations;
- (3) Receive confirmation from the ATC that such operations can be accommodated, wherein such ATC may outline any limitations, requirements or considerations pertinent to the RPA design capability or operational circumstances;
- (4) Supply the ATC with the intended RPA's performance details including at least the type of RPA, speed, rate of climb and descent and abort or emergency landing procedure;
- (5) Communicate, and have approved, or accept instructions pertaining to all movements of such RPA from the ATC via air-band communications;

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- (6) Include a detailed response and reaction procedure, agreed by both the ROC holder and the relevant ATC, in respect to the handling of any emergency, which as a minimum shall include:
- (i) Aborting the RPA's activity detailing the time to and expected landing place and capability;
  - (ii) Loss of control, which shall include both a technical failure of the RPA and a link failure between the RPS and the RPA; and
  - (iii) Procedures relating to a loss of communication between the ATC and the RPA Operator.





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### 18.5.8 C2 OPERATIONAL REQUIREMENTS

- (a) A prospective operator of an RPAS shall develop the C2 performance requirements safety case for approval of the Director General.
- (b) The following C2 functions shall be considered for the safety case:
  - (1) Downlink
    - (i) Link health telemetry [for BVLOS operations]
    - (ii) System health
  - (2) Telemetry
    - (i) RPA flight dynamics
    - (ii) Situation awareness [for BVLOS operations]
    - (iii) Data records
  - (3) Uplink
    - (i) Flight Control
    - (ii) RPA System control
    - (iii) Automatic Identification System update [for BVLOS operations]
    - (iv) RPAS hand over
    - (v) Link health telemetry [for BVLOS operations]
- (c) The RPAS operator shall present the target values of the C2 Performance requirements that were obtained from the safety case of the C2 functions to the Director General.
  - (1) Continuity
  - (2) Integrity
  - (3) Availability
  - (4) Latency of the C2 data link.

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## 18.5.11 BEYOND VISUAL-LINE-OF-SIGHT

### (a) Outside controlled airspace

An RPAS, intended for B-VLOS operations shall as a minimum, meet the following operational and technical requirements;

- (1) The operator shall demonstrate compliance with the following technical requirements:
  - (i) that the RPA will only be operated using command inputs;
  - (ii) has met the requirements prescribed in ZCARs;
  - (iii) that the RPA has the ability to remain clear from obstacles and any other hazards and can take appropriate action to execute collision avoidance from such obstacles or other aircraft where necessary. This ability shall be applicable for normal and lost/degraded C2 links unless:
    - (A) The area is void of other air traffic; or
    - (B) The operation occurs in specifically delimited or segregated airspace; or
    - (C) Any other mitigation is in place to avoid other aircraft, obstacles or any hazards.
    - (D) the C2 datalink frequency to be used for data link is deemed appropriate by the Director General; and
    - (E) The C2 performance requirements as specified in ZCARs are acceptable to the Director General;
- (2) The operator shall demonstrate to the satisfaction of the Director General the following operational capabilities prior to receiving approval for B-VLOS operations:
  - (i) Show how the intended RPA will perform all its flight tasks through control inputs whilst in flight, and that such device is not ordinarily required to be flown manually;
  - (ii) Command the RPA to follow a predetermined course or group of way- point inputs
  - (iii) Provide inputs to the RPA that in the event of needing to avoid any aircraft or other obstacle, the RPA pilot is able to interrupt or introduce commands or

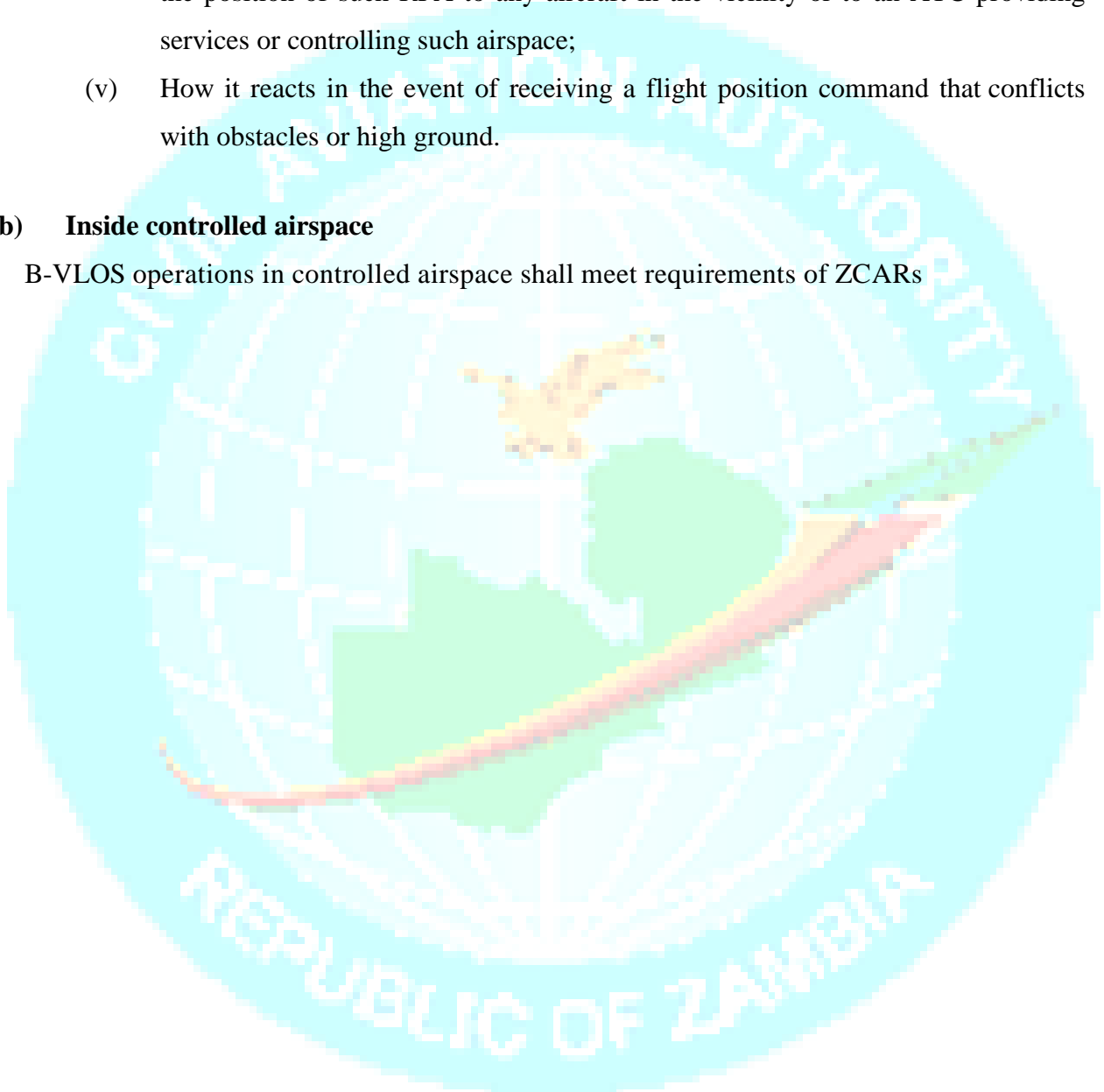
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instructions to the RPA, such that the RPA can be interrupted from its set course and can safely fly an alternative course, or land, to avoid known traffic;

- (iv) How the exact position of the RPA is displayed to the pilot, in real-time, on a moving map, such that the RPA pilot will be able to make radio calls and report the position of such RPA to any aircraft in the vicinity or to an ATC providing services or controlling such airspace;
- (v) How it reacts in the event of receiving a flight position command that conflicts with obstacles or high ground.

**(b) Inside controlled airspace**

B-VLOS operations in controlled airspace shall meet requirements of ZCARs



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**18.5.12 NIGHT OPERATIONS**

For operations at night, the holder of an ROC shall demonstrate to the satisfaction of the Director General, how in the instance of their RPAS:

- (a) they meet the requirements for B-VLOS operations below 400 feet; and
- (b) have strobe lighting installed on the RPA;
- (c) for fixed wing operations, have navigation lights or in the instance of a helicopter or multi-rotor RPA, have a beacon light installed;



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### 18.5.17 PRE-FLIGHT PREPARATION

- (1) Every remote pilot shall verify the relevant notifications for his/her area of operation before take-off, and coordinate if necessary.
- (2) Every remote pilot shall verify the NOTAM publication for his/her area of operation before take-off, and adapt the mission planning if necessary.
- (3) The remote pilot shall take into account the meteorological information relevant for his/her area of operations.
- (4) When planning a flight, the weather shall be assessed based on suitable documentation such as forecasts, current weather or other suitable information, to determine whether the planned flight can be carried out in accordance with the system's technical and operational limitations.
- (5) The weather in which flights are to take place shall be such that the system can be operated in a safe way in all phases of flight.
- (6) Before a flight is carried out, the flight shall be planned and prepared using up-to-date aeronautical charts, to determine in which type of airspace the flight will be carried out.
- (7) Before a flight is carried out, the flight shall be planned and prepared using information and documentation such as AIP, AIP Supplements and NOTAMs, so that the flight can be carried out safely within the conditions specified in the ROC and according to the Operations Manual.
- (8) The remote pilot shall have ensured before take-off that the flight can be carried out in a safe way.
- (9) The operator shall ensure that the system's status is inspected before a flight is carried out.
- (10) The remote pilot shall ensure that his/her physical and mental condition are such that the safety of the air traffic will not be endangered, failing which the remote pilot shall not start the flight.
- (11) The remote pilot shall ensure that all required documents are available before starting the flight.

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- (12) Before every flight, the roles and duties of each crew member shall be defined in writing. The remote pilot is responsible for the operation and safety of the aircraft and its payload, if applicable, and for the safety of all crew members.

### 18.6.5 RMT LOGBOOK

The log book shall contain the following information as a minimum:

- (a) Full name
- (b) Identification number
- (c) Name of employer
- (d) Record of all technical courses attended
- (e) Date of maintenance
- (f) Type and make of RPA (e.g. multirotor)
- (g) Work carried out (inspection, repair, overhaul etc.)
- (h) Signature of Quality Assurance.