

**SOUTH AFRICAN CIVIL AVIATION AUTHORITY  
CIVIL AVIATION ACT, 2009 (ACT NO. 13 OF 2009)**

The Director of Civil Aviation has, in terms of section 163(1) of the Civil Aviation Act, 2009 (Act No. 13 of 2009) read with Part 11 of the Civil Aviation Regulations, 2011 issued Document SA-CATS 101 as reflected in the Schedule hereto. This Document as contained in the Schedule shall come into operation on 1 July 2015.



**Poppy Khoza**  
**Director of Civil Aviation**  
**Date:**

**SCHEDULE 1**

**INSERTION OF SA-CATS 101 INTO THE TECHNICAL STANDARDS**

The following Document is hereby inserted into the SA-CATS:

**LIST OF TECHNICAL STANDARDS:  
REMOTELY PILOTED AIRCRAFT SYSTEMS**

- 101.01.5      GROUPING AND CLASSIFICATION**
- 1.      Classification of RPA
- 101.01.7      RPA SALES AND RE-SALES LABELLING**
- 101.02.2      RPAS SYSTEM SAFETY**
- 101.02.4      REGISTRATION AND MARKING**
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## 101.01.5 GROUPING AND CLASSIFICATION

### 1. Classification of RPA

The classification of RPA as prescribed in CAR 101.01.5 is as follows:

<u>Class</u>	<u>Table 1: RPAS Classification</u>			
	<u>line-of-sight</u>	<u>Energy (kJ)</u>	<u>Height (ft)</u>	<u>MTOM (kg)</u>
<u>Class 1A</u>	<u>R-VLOS/VLOS</u>	<u>E &lt; 15</u>	<u>h &lt; 400</u>	<u>m &lt; 1.5</u>
<u>Class 1B</u>	<u>R-VLOS/VLOS/E-VLOS/</u>	<u>E &lt; 15</u>	<u>h &lt; 400</u>	<u>m &lt; 7</u>
<u>Class 1C</u>	<u>VLOS/EVLOS</u>	<u>E &lt; 34</u>	<u>h &lt; 400</u>	<u>m &lt; 20</u>
<u>Class 2A</u>	<u>VLOS/EVLOS</u>	<u>E &gt; 34</u>	<u>h &lt; 400</u>	<u>m &lt; 20</u>
<u>Class 2B</u>	<u>Experimental/Research</u>			
<u>Class 3A</u>	<u>BVLOS</u>	<u>E &gt; 34</u>	<u>h &lt; 400</u>	<u>m &lt; 150</u>
<u>Class 3B</u>	<u>VLOS/EVLOS</u>	<u>Any</u>	<u>h &gt; 400</u>	<u>m &lt; 150</u>
<u>Class 4A</u>	<u>BVLOS</u>	<u>Any</u>	<u>h &gt; 400</u>	<u>m &lt; 150</u>
<u>Class 4B</u>	<u>Any</u>	<u>Any</u>	<u>Any</u>	<u>m &gt; 150</u>
<u>Class 5</u>	<u>Reserved</u>	<u>Reserved</u>	<u>Reserved</u>	<u>Reserved</u>
<u>Reserved - means to be defined in the future</u>				
<u>h - means height above the surface</u>				
<u>E - means energy at impact</u>				
<u>Note: All operations are limited to radio line-of-sight</u>				

## 101.01.7 RPA SALES OR RE-SALES LABELLING

On the sale or re-sale of any RPA, the seller must display and provide a notice, to notify the purchaser of the following information:

*"Note: The operation of Remotely Piloted Aircraft (RPA) is regulated in terms of the South African Civil Aviation Regulations.*

*Operations as a hobbyist are subject to the terms of Part 94, whereas private use is restricted in terms of Regulation 101.01.4 of the Civil Aviation 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 must observe all statutory requirements relating to liability, privacy and any other laws enforceable by any other authorities.*

*For all other use –*

- (a) the RPA must first be approved by the South African Civil Aviation Authority for use by way of an RPA Letter of Authority (RLA);*
- (b) all RPAs must be registered by the South African Civil Aviation Authority prior to use;*
- (c) an RPA may only be operated in terms of Part 101 of the South African Civil Aviation Regulations which includes specific requirements that the operator shall hold an RPA Pilot License; and*

#### **101.02.2 RPAS SYSTEM SAFETY**

- (1) 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:
  - (a) The RPAS Operating Manual from the manufacturer;
  - (b) 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:

## **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
- 1.7 payloads (specific or generic)
- 1.8 use of frequencies
- 1.9 remote pilot station
- 1.10 ground support equipment
- 1.11 flight recovery system

## **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
- 2.9 propulsion system (such as engine/motor, fuel, electrical, hydraulic, pneumatic, gas, solar)

## **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 flight control surfaces and actuators
- 3.4 location of all air data sensors, antennas, radios, and navigation equipment with respect to segregation and redundancy
- 3.5 autopilot (type, manufacturer, description of working method)
- 3.6 navigation systems (description of the components, together with horizontal, vertical position and velocity accuracy)
- 3.7 sensors and/or telemetry

## **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 a safe manner.

## **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.

### **101.02.4 REGISTRATION AND MARKING**

#### **1. Identification plate**

- (1) Every South African-registered RPA must have affixed to it an identification plate (engraved, stamped or etched) with its nationality and registration marks.

- (2) The identification plate must—
- (a) be made of fireproof material of suitable physical properties;
  - (b) be affixed to the RPA in a prominent position;
  - (c) include the registration mark issued by the authority which appears on the RPA's certificate of registration; and
  - (d) be commensurate with the size of the RPA.

## **2. Display of marks**

- (1) The nationality and registration marks must be –
- (a) 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;
  - (b) legible;
  - (c) displayed to the best possible advantage having regard to the construction or features of the RPA; and
  - (d) kept clean and visible at all times.
- (2) The registration mark letters and hyphen must be printed/painted in Roman characters, in black on a yellow background. The height of the yellow background shall be at least 120% of the font height.
- (3) The size of the registration mark must be commensurate to the size of the RPA.

## **3. Location of marks**

- (1) The marks on a fixed wing RPA must appear –
- (a) on the bottom and top surface of each wing; and
  - (b) 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 must appear –
- (a) For spherical RPA the marks must be proportional to the surface area in two places diametrically opposite one another.
  - (b) For non-spherical RPA the marks must be proportional to the surface on each side.

## **4. Allocation and specification of marks**

- (1) The South African nationality marks are the capital letters ZS, ZT, and ZU.

- (2) The nationality and registration marks must consist of capital letters in Roman characters without ornamentation.
- (3) The width of each letter (except letter "I") and the length of the hyphen must be two-thirds of the height of the letter – where possible.
- (4) Each letter must 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 must be solid and the thickness of those lines must be one-sixth of the height of the letter.

### **101.03.2 REQUIREMENTS FOR ISSUE OF AN RPL**

#### **1. Medical assessment report**

The medical assessment report referred to in CAR 101.03.2 is contained in the appropriate form in the Authority website.

### **101.03.3 THEORETICAL KNOWLEDGE EXAMINATION**

#### **1. General**

- (1) The subjects and items relevant to the different categories of licence (aeroplane, helicopter and multi-rotor) are specified below.
- (2) Rewrite after failure
  - (a) A candidate may not apply to rewrite an examination until he or she has received the official result notification.
  - (b) A candidate who has failed an examination conducted by the Authority for the issue of a flight crew licence may not rewrite the examination:
    - (i) in the case of a first or second failure, within a period of 7 calendar days;
    - (ii) in the case of a third or subsequent failure, within a period of 2 calendar months;
    - (iii) where a mark of less than 50% was achieved, within a period of 2 calendar months.
  - (c) 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



- (a) 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.
- (b) The application shall be accompanied by the appropriate fee prescribed in Part 187.
- (c) If the re-mark results in a pass of the examination concerned, the re-marking fee will be refunded.
- (d) 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.

(4) Remote pilot general examination

- (a) This examination must be passed before the first licence examination may be written.
- (b) The examination is not required for any subsequent licence examinations.

(5) Licence examinations:

- (a) Remote Pilot Licence (Aeroplane).
- (b) Remote Pilot Licence (Helicopter).
- (c) Remote Pilot Licence (Multicopter).

**2. Items applicable to the remote pilot general examination**

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

- (a) SACAR Part 101 and Document SA-CATS 101.

(2) Human factors

- (a) Vision
  - (i) Empty field myopia
  - (ii) Adaptation to darkness
  - (iii) Autokinesis
- (b) Stress management
  - (i) Causes of stress (stressors)
- (c) Signs and symptoms of fatigue.

- (3) Meteorology
  - (a) Factors affecting air density
  - (b) Fog and mist
  - (c) Wind and gusts
  - (d) Thunderstorms.
  - (e) Aviation weather reports.
- (4) Navigation
  - (a) Latitude and longitude
  - (b) Aeronautical chart information (VFR)
  - (c) GPS
    - (i) Components of a GPS system as used on an RPA
- (5) Lighting for remotely piloted aircraft.

### **3. 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)
  - (a) Weight
  - (b) Lift
  - (c) Drag
  - (d) Thrust
- (3) Axes of an aircraft and motion about the axes
  - (a) Lateral axis – pitch
  - (b) Longitudinal axis – roll
  - (c) 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)
  - (a) Electric motors
    - (i) Brushed motors
    - (ii) Brushless motors
    - (iii) Motor ratings.
  - (b) Electronic speed controllers
  - (c) Petrol engines
  - (d) Fuel mixtures
  - (e) Propellers and rotors

- (i) Sizes of propellers (length and pitch)
- (f) Rotors.
- (6) Weight and balance (as applicable to the category of licence)
  - (a) Dimensions and weight of aircraft
  - (b) Arm, moment, reference datum, flight station, centre of gravity
  - (c) Forward and aft limitations of CG.
- (7) Servo motors and servo actuators used in remotely piloted aircraft.
- (8) Radio control link (C2 link)
  - (a) Radio control transmitter and receiver
    - (i) Setup (as applicable to the category of licence).
  - (b) Frequencies used.
- (9) Data link
  - (a) Airborne receiver
  - (b) 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.
  - (c) Frequencies used
  - (d) Setup.
- (10) Wireless links general
  - (a) Line-of-sight
    - (i) Fresnel zones
  - (b) Interference
  - (c) Coverage range
  - (d) Antennas as used in remotely piloted aircraft systems.
- (11) Flight controller (autopilot system)
  - (a) Inputs and outputs
  - (b) Inertial measurement unit (IMU)
  - (c) Flight modes and facilities
  - (d) Setup.

(12) Batteries

- (a) Sealed lead-acid (SLA)
- (b) Nickel-cadmium (NiCad)
- (c) Nickel-metal hydride (NiMH)
- (d) Lithium-ion (Li-Ion)
- (e) Lithium polymer (Li-Poly/LiPo)
- (f) Charging of batteries
- (g) Safety concerns
  - (i) Battery fires.

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

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

(1) The stall

- (a) Boundary layer
- (b) Stalling angle of attack
- (c) Aeroplane characteristics at the stall.

**5. Items applicable to the remote pilot licence (Helicopter) (RPL (H))**

(1) Flight controls

- (a) Collective control
- (b) Cyclic control
- (d) 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.

**6. Items applicable to the Remote Pilot Licence (Multi-rotor) (RPL (MR))**

(1) Different configurations and frames.

## **101.03.4 FLIGHT TRAINING**

### **1. General**

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

### **2. 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.

### **3. Items applicable to the Remote Pilot Licence (Aeroplane) (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

- (a) At altitude
- (b) After takeoff
- (c) On the approach.

- (14) VTOL - Vertical takeoff and landing (if applicable).

### **4. 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.

#### **5. 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 multi-rotor in the direction of flight.
- (11) From hover fly a circle rotating (yawing) the multi-rotor nose-in to the centre of the circle.
- (12) Transition from hover to forward flight.
- (13) Climbing and descending from level flight.
- (14) Turns from level flight.
- (15) Speed control in level flight.
- (16) Approach and landings.
- (17) Actions after failure of a motor.

### **101.04.5 OPERATIONS MANUAL**

Each ROC holder shall submit to the Director 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 1: General**

- 1. Administration & control
  - (a) Company information, address and contact details
  - (b) Table of Contents of Manual
  - (c) List of effective pages to control the version and revision of such OM
  - (d) Revision number
  - (e) Distribution list

- (f) Definitions and Acronyms
  - (g) Statement of Compliance
2. Organization and operational control
- (a) Organizational structure including an Organogram;
  - (b) Organizational responsibilities of post holders and designated persons;
  - (c) Responsibilities of support personnel;
  - (d) Technical description of each RPAS for intended use by the ROC holder;
  - (e) Area or scope of operation;
  - (f) Operating limitations and considerations required by the Director;
  - (g) Operational Control Parameters;
  - (h) Accident prevention and safety programme;
  - (i) Flight crew qualifications and duties
  - (j) RPA Operations;
  - (k) Crew health
  - (l) Documents and Record keeping

**Part 2: Operating Procedures**

1. Flight planning / preparation
- (a) Scope and feasibility
  - (b) 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
  - (c) Risk management - Identification of the hazards, risk assessment, mitigating procedures.
  - (d) Communication procedures;
  - (e) Notification of intended operations to affected persons;
  - (f) Location and site permissions
  - (g) Weather considerations

2. On site procedures & pre-flight checks

- (a) Site visual survey;
- (b) Selection of operating area;
- (c) Crew briefing
- (d) Cordoning off procedure (where applicable);
- (e) Communication range and capability requirements;
- (f) Weather observations;
- (g) Re-fuelling or recharging;
- (h) Loading of operational equipment;
- (i) Preparation and assembly of RPA on site;
- (j) Pre-flight and post flight checks

3. Flight procedure

- (a) start
- (b) take-off
- (c) in flight
- (d) landing
- (e) shutdown

4. Emergency procedure

- (a) Unique to the RPA to be operated;
- (b) Fire - Risk and preventative measures;
- (c) Accidents considerations and emergency response plan
- (d) Loss of control link
- (e) RPA - normal, abnormal and emergency procedures

**Part 3: Training**

1. Details of the operator's training programme

**Part 4: 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 organisation 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 unauthorised 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;
- (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 5: Safety management**

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

**101.05.3: CONTROLLED AIRSPACE**

- (1) An RPA, intended for operations within an ATZ or CTR, shall as a minimum, meet the following technical requirements, which must 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:
  - (a) 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 and/or the applicable ATSU or CAMU according to an FUA application;
  - (b) Be fitted with an altimeter, capable of displaying to the operator on the RPS, the RPA's altitude above ground level, corrected for ambient pressure (QNH);
  - (c) 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
  - (d) In the instance of an aeroplane, be fitted with functioning navigation lights.
- (2) An ROC holder, who intends operating in an ATZ or CTR, shall as a minimum, meet the following operational requirements:

- (a) 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;
- (b) Notify the relevant ATSU in advance of such operations, outlining the intended type and scope of operations;
- (c) Receive confirmation from the ATSU that such operations can be accommodated, wherein such ATSU may outline any limitations, requirements or considerations pertinent to the RPA design capability or operational circumstances;
- (d) Supply the ATSU 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;
- (e) Communicate, and have approved, or accept instructions pertaining to all movements of such RPA from the ATSU via air-band communications;
- (f) Include a detailed response and reaction procedure, agreed by both the ROC holder and the relevant ATSU, 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 ATSU/CAMU and the RPA Operator.

**101.05.8: C2 OPERATIONAL REQUIREMENTS**

- (1) A prospective operator of an RPAS shall develop the C2 performance requirements safety case for approval of the Director.
- (2) The following C2 functions shall be considered for the safety case:
  - (a) Downlink
    - (i) Link health telemetry [for BVLOS operations]
    - (ii) System health
  - (b) Telemetry
    - (i) RPA flight dynamics
    - (ii) Situation awareness [for BVLOS operations]
    - (iii) Data records
  - (c) 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]
- (3) 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.
- (a) Continuity
  - (b) Integrity
  - (c) Availability
  - (d) Latency of the C2 data link.

#### **101.05.11: BEYOND VISUAL-LINE-OF-SIGHT**

##### **1. Outside controlled airspace**

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

- (a) 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 Technical Standard 101.02.2;
  - (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:
    - (aa) The area is void of other air traffic; or
    - (bb) The operation occurs in specifically delimited or segregated airspace; or
    - (cc) Any other mitigation is in place to avoid other aircraft, obstacles or any hazards.
  - (iv) the C2 data link frequency to be used for data link is deemed appropriate by the Director; and
  - (v) The C2 performance requirements as specified in Technical Standard 101.05.8 are acceptable to the Director;

- (b) The operator shall demonstrate to the satisfaction of the Director the following operational capabilities prior to receiving approval for BVLOS 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 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 ATSU 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.

## **2. Inside controlled airspace**

BVLOS operations in controlled airspace shall meet requirements of Technical Standards 101.05.3 and 101.05.11 1.

### **101.05.12: NIGHT OPERATIONS**

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

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

### **101.05.17: PRE-FLIGHT PREPARATION**

- (1) Every remote pilot shall verify the relevant notifications for the 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.
- (12) Before every flight, the roles and duties of each crew member must 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.

#### **101.05.22 FLIGHT FOLIO**

The operator shall retain the following information for each flight in the form of a flight folio:

- (a) aircraft registration;
- (b) date;
- (c) names(of) flight crew members;
- (d) duty assignment of flight crew members;
- (e) place of departure;
- (f) place of arrival;
- (g) time of departure (off-block time);
- (h) time of arrival (on-block time);
- (i) hours of flight;
- (j) nature of flight;
- (k) incidents, observations (if any);
- (l) signature of remote pilot;

- (m) the current maintenance statement giving the aircraft the aircraft maintenance status of what maintenance, scheduled or out of phase, is due;
- (n) all outstanding deferred which affect the operation of the aircraft;
- (o) fuel and oil used (if applicable);
- (p) fuel and oil uplift (if applicable);
- (q) battery charge status (beginning and end of the flight, if applicable)

#### **101.06.4 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. multi-rotor)
- (g) Work carried out (inspection, repair, overhaul etc.)
- (h) Signature of Quality Assurance Personnel

## APPENDIX A

### Pictorial view of VLOS and E-VLOS

