



The UAS flight test procedure is to test the compliance of the UAS against following Part 3 Certification Criteria of the QCI UAS Certification Scheme:

<b>Section</b>	<b>Detail</b>
2.1	Speeds
2.2	Range
2.3	Endurance
2.3 (a)	Fuel consumption rate
2.3 (b)	Battery discharge rate
2.4	Operational Altitude
2.5	Operational Envelop (Applicable for Medium and above categories of UAS).
2.6	Ceiling Height
2.8 (a)	Determine that UAS is able to maintain a stable flight without pilot input
2.8 (b)	Determine that pilot is able to control UAS with ease.
3.1 (b)	Vibration level from Flight Logs (Applicable for Engine Operated UAS) or Absence of Emission of Explosive or toxic gases during normal operation
3.1 (c)	Absence of discharge of corrosive fluid during normal operation (Applicable for Battery Operated UAS).
4.1 (d)	Determine that UAS is free from excessive vibrations under any operational speed and power condition. (Verification from flight logs).
6.1 (a)	Determine full functioning of data link communication
6.1 (b)	Demonstration of system to alert the remote pilot with aural and visual signal, for any loss of command and control data link
6.1 (c)	Determine that communication range is sufficient to have a permanent connection with the UAS
6.1 (d)	Determine that when data link is lost or in other contingencies, the UAS follows a predefined path to ensure safe end of flight within the required area restrictions
6.1 (e)	Determine the capability of system to inform remote pilot by means of a warning signal in the event of data link loss
6.1 (f)	Implementation of command link loss strategy in the UAS
8.1 (a)	Capability of GPS receiver and whether it meets the requirements and functionality of the UAS
8.1 (b)	Operation and functioning of flashing anti-collision / strobe lights in the UAS
8.1 (f)	Determine whether Geo-fencing capability has been implemented
8.1 (g)	Determine whether Autonomous Flight Termination System or Return Home (RH) option has been implemented
8.1 (h)	Demonstration for verification of operation, functionality and parameters of SSR transponder (mode 'C' or 'S') or ADS-B-OUT equipment
8.1 (i)	Determine whether Detect and Avoid capability option has been implemented (Only for UAS intending to operate in Controlled Airspace)
8.1 (k)	Demonstration of Barometric equipment capability of remote subscale setting from GCS
8.1 (l)	If GSM SIM is installed, verification of real time tracking of flight on software dashboard



**FLIGHT TEST SCHEDULE AND CHECKLIST**

The Flight test for UAS is to be conducted as per the flight test schedule and their respective activities given below. All tests and verifications / validations are to be conducted as per their respective test plans / test cases. The given test stages may or may not be conducted in single go. If endurance of the UAS or duration of flight is not sufficient to conduct all the planned tests as per schedule, additional flights should be planned.

After completion of the flight test, the manufacturer shall submit logs and evidence to the TQ Cert. TQ Cert needs to witness all tests and maintain a record of the same

**Flight test schedule:**

<b>TEST STAGE</b>	<b>MINIMUM DURATION AND HEIGHT</b>
Stage 1: Pre-flight assessment	As per Checklist
Stage 2: Take-off	Rotary Wing: 5 mins hover at 10m AGL on takeoff Fixed Wing: Direct to Stage 3
Stage 3: Loiter / Hover	5 mins at 60 m
Stage 4: Cruise	60% time of endurance
Stage 5: Return to home location	Loiter or Hover at home location for pre-programmed duration
Stage 6: Land	Land immediately after pre-programmed hover or loiter at home location
Stage 7: Endurance test	Full endurance test



**STAGE 1**

**A. Pre-Flight Assessment**

S. No	Check (whichever applicable)	Manufacturer Report value (to be filled by manufacturer)	Test Lab observations (to be filled by test lab)	
			Observed value / details	Passed Y / N
1	Max. All up Weight of UAS			
2	Weight of UAS without battery			
3	VTOL motor model			
4	Forward Thrust motor model			
5	VTOL Propeller model			
6	Forward thrust propeller model			
7	Battery type			
8	Battery dimension	Width: Length: Height:		
9	Battery Weight			
10	Battery mAh			
11	Payload model			
12	Dimension of UAS	Width/Span: Length: Height:		
13	Engine/motor on with throttle	No excessive vibration		
	a) 20% less than take off throttle for multi-copter & Hybrid			
	b) 80% throttle for FW in static condition (2 mins on ground just before flight)	All components intact		
14	GCS display	Communication link active and working		
		HUD orientation and value correct		
		GPS location of drone correct		
15	Actuator functioning	As per operator input		
16	Anti-collision / Strobe lights	Lights are on and flashing		

Tolerance of 5% will be allowed for Serial numbers 1, 2 & 9



**STAGE 2: Take-off**

Rotary Wing: 5 mins hover at 10m AGL on takeoff

Fixed Wing: Direct to Stage 3

**STAGE 3: Loiter / Hover**

A. If UAS is of Rotary wing configuration

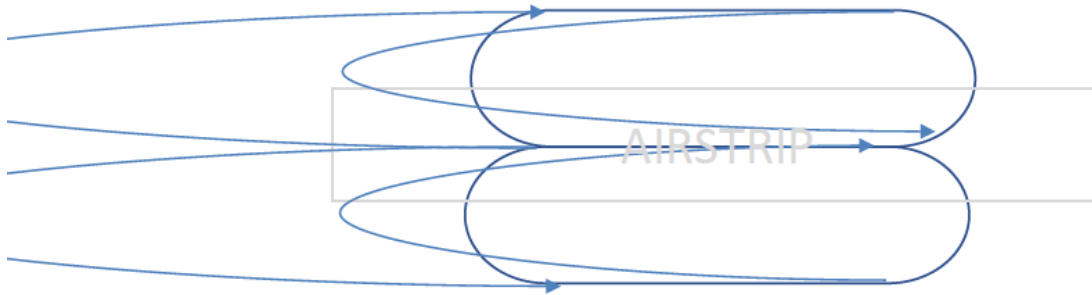
S. No.	Activity (whichever applicable)	Compliance	Section	UAS Response observed	Passed Y/N
1.	Hover at max 10 m AGL	UAS is free from excessive vibration	4.1 (d)		
		UAS is able to maintain a stable flight without pilot input	2.8 (a)		
2.	Take pilot control of UAS from auto-hover and move in following directions: Left, Right, Forward, Backward, Up and down	Pilot is able to control UAS with ease.	2.8 (b)		

B. If UAS is of Fixed Wing configuration

S. No.	Activity (whichever applicable)	Compliance	Section	UAS Response observed	Passed Y/N
1.	Take off and loiter at 100 m AGL for 5 mins	UAS is free from excessive vibration	4.1 (d)		
		UAS is able to maintain a stable flight without pilot input	2.8 (a)		
2.	Take pilot control of UAS from auto-loiter and conduct this maneuver:  Level fly the UAS along the airstrip, turn from left and return, go to the other side, turn from left, follow the airstrip direction and now turn back from right, go to the other side, turn from right and return back. Put the UAS back in	Pilot is able to control UAS with ease.	2.8 (b)		



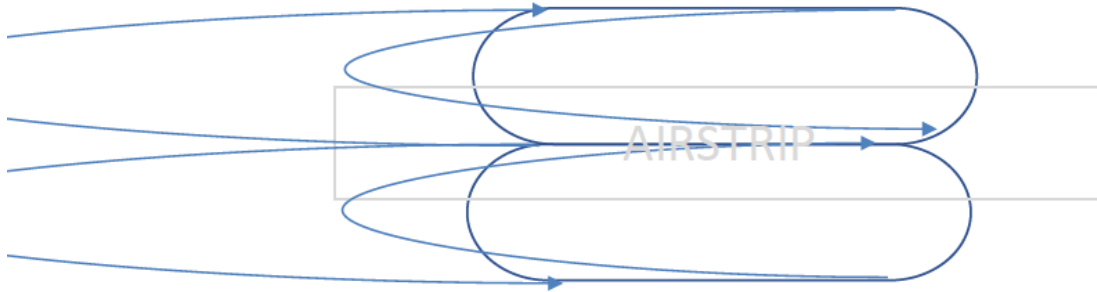
auto-loiter



Flight Path for Test Flights

C. If UAS is of VTOL Fixed Wing configuration

S. No.	Activity (whichever applicable)	Compliance	Section	UAS Response observed	Passed Y/N
1.	Hover at 10 m AGL	UAS is free from excessive vibration	4.1 (d)		
		UAS is able to maintain a stable flight without pilot input	2.8 (a)		
2.	Take pilot control of UAS from auto-hover and move in following directions: Left, Right, Forward, Backward, Up and down	Pilot is able to control UAS with ease in VTOL mode.	2.8 (b)		
3.	Take pilot control of UAS from auto-loiter and conduct this maneuver:  Level fly the UAS along the airstrip, turn from left and return, go to the other side, turn from left, follow the airstrip direction and now turn back from right, go to the other side, turn from right and return back. Put the UAS back in auto-loiter	Pilot is able to control UAS with ease in Fixed wing mode	2.8 (b)		



**Flight Path for Test Flights**



**STAGE 4 : Cruise**

**Cruise duration:** Max 70% of the endurance time claimed by the manufacturer or 120 mins whichever is lower for the UAS

**Cruise mission settings:** For the cruise test stage, the UAS is supposed to be operated as per the given guidelines:

1. A Waypoint or grid-based flight plan must be created such that there is a straight-line path from one turning point to the other turning point. The distance between these points must be such that the time taken by the UAS to travel between them must not be less than 30 seconds.
2. The UAS must always remain in the Visual Line of Sight of the operator.
3. The UAS must not cross the flight altitude of 120 m AGL at any point of time.
4. The UAS must have a way point outside the Geo-fence defined via the Permission Artefact
5. The UAS C2 link must be continuously connected to the C2 link at the ground control station.
6. The UAS geo-location and key flight parameters must stream and display continuously on the Ground Control Software screen running on the Ground control station.

**Cruise flight test schedule and report:**

S. No.	Activity (whichever applicable)	Compliance	Section	UAS Response observed	Passed Y/N
1.	During completion of minimum two swaths of straight-line flight between two farthest point in the flight plan	UAS maximum operating speed/ cruise speed is reached but not crossed	2.1 (ii)		
		Capability of GPS receiver whether it meets the requirements and functionality of the UAS.	8.1 (a)		
		Flashing anti-collision / strobe light are visible all the time from all 360° especially when the UAS is at its farthest point.	8.1 (b)		
2	On completion of minimum two swaths of straight-line flight between two farthest point in the flight plan	UAS communication link is fully functional all the time	6.1 (a)		
		Communication range is sufficient to have a permanent connection with the UAS	6.1 (C)		
	UAS flight waypoint outside the geo-fence.	Geo-fencing capability has been	8.1 (b)		



3.	Did the UAS cross the geo-fence to reach that point?	implemented.			
4.	Towards the end of the cruise duration, disconnect the communication link from the GCS for more than 10 seconds when the UAS is at the farthest point in the flight plan	System alerts the remote pilot with aural and visual signal, for any loss of command and control data link	6.1 (b)		
		System capable to inform remote pilot by means of a warning signal in the event of data link loss	6.1 (e)		
		When data link is lost for more than 10 seconds or as defined in the specification, the UAS follows a predefined path to ensure safe end of flight within the required area restrictions	6.1 (d)		
		Demonstration of implementation of command link loss strategy in the UAS	6.1 (f)		
5	On completion of minimum two swaths of straight-line flight between two farthest point in the flight plan	Autonomous Flight Termination System or Return Home (RH) option has been implemented	8.1 (g)		
6	Throughout the whole flight observe the terrain altitude of UAS on the GCS	The maximum altitude attained throughout should not be more than the declared maximum attainable height (i.e. 200ft or 400ft as applicable)	2.4		
7	Checks during cruise Flight	Detect and Avoid capability option has been implemented (Only for UAS intending to operate in	8.1 (i)		





	Controlled Airspace)			
	Barometric equipment capability of remote subscale setting from GCS. (If installed)	8.1 (k)		
	If GSM SIM is installed, verification of real time tracking of flight on software dashboard.	8.1 (l)		

**STAGE 5: Return to Home**

Loiter or Hover at home location for pre-programmed duration

**STAGE 6: Land**

S. No.	Activity/compliance	UAS Response observed	Passed Y/N
1.	UAS could land smoothly and softly without any damage to any part.		

**STAGE 7: Endurance Test**

Endurance Test procedure

1. A fresh flight must be conducted with full battery charge or fuel level for endurance test
2. Suitable calibrated instruments must be used to measure the Battery voltage or fuel level before and after the flight.
3. For UAS with less than or equal to 120 mins of endurance, full endurance flight test must be conducted
4. For UAS with endurance more than 120 mins, battery discharge rate or fuel consumption rate must be measured for: 120 min duration flight or 20% of the endurance time, whichever is longer for the UAS

**For UAS within 120 min Endurance:**

S. No	Before Flight start		After flight Completion		UAS Endurance Observed	Manufacturer Endurance Value	Passed Y/N
	Batt. Volt / Fuel Level	Time (T0)	Batt. Volt / Fuel Level	Time (T1)	(T1-T0)		

**For UAS more than 120 min Endurance:**



S. No	Before Flight start		After flight Completion		UAS Endurance Observed	Manufacturer Endurance Value	Passed Y/N
	Batt. Volt / Fuel Level	Time (T0)	Batt. Volt / Fuel Level	Time (T1)	(F0-F1)/(T1-T0)		

**Declaration of Successful Flight test Applicant name:**

**Applicant name:**  
**UAS Manufacturer:**  
**UAS model:**

This is to declare that the above UAS could / couldn't complete the entire Flight Test without any technical failure, snag or glitch of any manner.

The compliance of UAS against each test is separately covered in the test report. This declaration doesn't guarantee the same.

**Authorized signatory**