

# Certification Scheme for UAS | 12 Feb 2022

## FAQs

### Technical | General, Performance, Power plant, Structure and Material and Construction

1. Whether Range & Endurance is a factor of MTOW? What payload needs to be made available for the calculation of range & endurance (no payload or max payload?)

Yes. Range as well as endurance is with MTOW. Also, for MTOW, it is with that configuration of payload, which has Max Weight.
2. What is the minimum requirement of a spraying drone considering that spraying will be done over a field at the height of 5 meter in a far off area? What waivers are there for spraying drones?

Current Certification criteria is for the performance of the drone. As regards its application and its performance in respective applications such as spraying etc. the same needs to be specified by the manufacturer being the OEM. There are no waivers in the certification requirements as these are the minimum standards for safety and reliability.
3. Is hexacopter configuration mandatory for agriculture spray drones, or quad configuration is also allowed?

For configuration there are no limiting conditions specified in the criteria towards its Application.
4. What is the performance based parameters, for early stage start-ups, there is not enough equipment for these internal testing?

These are performance based parameters determined through calculations and flight testing.
5. The performances can be witnessed only by fixing sensors across various portions of the airframe. Is that what is expected from manufacturers as part of the process?

Yes. Sensors along with appropriate instrumentation for display and recording.
6. For the barometer and altitude measurement: For BVLOS operations will an adjustable QNH be considered valid for the subscale setting requirement, if there is a LIDAR rangefinder on-board for measurement of the terrain below the aircraft, can that be considered as an alternative/improvement to the subscale setting?

Subscale setting requirement is for QNH and QFE. These are safety requirements and any incorrect setting is a safety hazard. Adjustable QNH setting meets the subscale setting requirement.
7. How can the max altitude test be done, as DGCA approved only 400 ft. for drones?

Manufacture need to determine by calculation the max attainable altitude as per their design. 400 ft is the limit. The firmware should restrict the drone within that limit.
8. What altitude endurance test will be done?

It will be done on Operational altitude.
9. How can we check GPS / GNSS receiver, normally testing of GPS for other aerospace products, the GPS normally is tested using a very expensive GNSS/GPS constellation generator connected directly to the GPS antenna UHF/SMA Port, hence do Manufacture need to perform a comprehensive GPS/GNSS performance test or will it be based on performance criteria of drone (Plan of Action)?

It will be based on the performance criteria of Drone. Further, a latitude and longitude of a few representative reference verification points can be marked on the ground and the GPS receiver on board can be verified with respect to these reference points.

10. Is CG calculated by software based on RM data sufficient or manufacture have to go for physical testing of drones?  
It is a calculation with reference to a datum point.
11. If 95 KJ is the max. Kinetic energy, will that not remove the need for parachutes and other recovery systems? Because, for weights less than 25kg, kinetic energy will be much less than that even in case of freefall.  
Yes. As per calculations of Max KE, if it is less than 95 KJ, there would be no need for recovery systems such as Parachutes etc. However, for drones having larger Max AUW, it would be necessary to arrest the Max KE below the permitted value using appropriate recovery systems.
12. Whether UAS above 80kg cannot be certified, whereas the certification process placed a limit until 150kg (or less)?  
In cases where the drones are greater than 80 Kg, leading to Max KE beyond permissible limits of 95 KJ, it would be necessary to have appropriate systems of recovery such as parachutes etc. to keep the drone within allowed limits of Max KE.
13. What all parameters are expected to be declared for the operational envelope?  
Operational envelope is related to the boundary conditions of flight with reference to and combination of Max All Up Weight, Centre of Gravity, Altitude, Temperature and Air Speed.
14. Would static analysis of airframe using finite element analysis (FEA) software for flight limit loads be adequate for compliance?  
Static Test to limit load is the basic requirement in Certification Scheme where means of compliance is Static Load test report. Calculation of max flight loads and initial estimation of structural strength, appropriate software or FEA analysis can be used. Demonstrate would generally mean proving through actual test. Demonstration of this criteria requirement is applicable to medium and above classification of drones (if Composite used in airframe). For small and below, theoretical calculations as stated above would suffice.
15. Would vibration analysis of airframe using finite element analysis (FEA) software for flight limit loads be adequate for compliance? Or, ground test \ flight test data is also required?  
Flight test data for vibration analysis is also required since witness by assessment team during flight test validation. The test for any operational speed and power condition.
16. What should be the approach to find life of UAS? Or, how to specify propeller life, as it is difficult to get it from OEM? Is there any standard method to calculate it?  
The lifespan of drone is determined by the manufacturer; the age is calculated based on flying cycles. As a rule of thumb, each cycle involves "take off/landing." Fuselage and wings (fixed, rotary) are subjected to stress. Based on design review, validation by tests and experience, life of Drone could be decided by the manufacturer. Appropriate software can also be used for life calculations based on calculated flight loads on the drone.

17. What is the best approach to find number of permissible landing of Quadcopter?  
The lifespan of drone is determined by the manufacturer; the age is calculated based on flying cycles. As a rule of thumb, each cycle involves "take off/landing." Fuselage and wings (fixed, rotary) are subjected to stress. Based on design review, validation by tests and experience, life of Drone could be decided by the manufacturer.
18. If manufacturer can submit enough flight logs conducted across a long time period, can that be considered for the life of UAS justification?  
Yes that is acceptable, but extrapolation would not be permitted.
19. Will CB do independent tests to verify the life of UAS?  
No, CB will not do independent testes.
20. Should we perform simulation or physical test or lab test to find number of permissible landing and life of structure?  
Carrying out simulation using software is a tool for design review. The lifespan of drone is determined by the manufacturer, the age is calculated based on flying cycles. As a rule of thumb, each cycle involves "take off/landing." Fuselage and wings (fixed, rotary) are subjected to stress. Based on design review, validation by tests and experience, life of Drone could be decided by the manufacturer. Determination of life using simulation tools is acceptable.
21. CG of aircraft change as per the payload distribution but in terms of multi-rotor, whereas if the design is symmetric about x and y and the payload falls directly at the center point of the symmetric axis which is CG of x and y, is it correct to write the basic formula to complete this or else you can get this thing automatically from design software when the product and assembly w.r.t to material is complete?  
Calculations of CG using appropriate software are also acceptable. But the same sought to consider all the possible configurations of the drone payloads including variable ones such as liquids that will be off-loaded during applications.
22. Does the 867-868 MHz band require a license to operate?  
This need to be confirm from WPC wing of DoT (Department of Telecommunications) in this regards.
23. Is there any kind of certification for the material used in the drone frame?  
Please refer S.N. 5.1 of the Technical criteria of the UAS Certification Scheme.
24. In case of delivery drones, payload weight and type of payload will be different, what is the process for that?  
The calculation is done based on empty weight, all up weight (MTOW). The payload weight may vary the operational envelop (Range). The manufacturer should prepare a chart ( V-n diagram) to address this issue and it should be part of flight manual.
25. What about the strength of moving parts of a drone's structure? (like grippers or moving arms)  
One of the best practices of aviation industry is to categorise all parts into three groups namely: Class-I, Class-II and Class-III. Parts that are structurally significant and subjected to stress during life cycle of the product and failure of such parts will lead to catastrophic failure of the UAS are grouped as Class-I Parts. The parts whose failure may not lead to catastrophic failure of the UAS but will make it grounded for repair and maintenance are grouped as Class-II Parts. All other less significant items (bolts, nuts, standard parts, simple bracketry items) will be grouped as Class-III Parts. Class-I and

Class-II parts are important from the strength point of view and hence care need to be exercised right from material selection, design, design review, manufacturing process, inspection and quality control, test and validation.

26. What all tests are required to be conducted in material tests?  
Physical properties and chemical analysis tests. If the raw-material supplier has conducted these tests and provided copies of test reports, that would be enough. Independent testing is necessary in the absence of manufacturer's test reports and re-testing unless so desired by the customer.
27. For the material selection, are the results or details obtained from the supplier on the material coupon tests (for composites) are enough? Or do CBs need another set of test during the independent or laboratory test stage of certification?  
For initial material selection, review of standard design data of the materials would be good enough. After procurement, Physical properties and chemical analysis tests. If the raw-material supplier has conducted these tests and provided copies of test reports, that would be enough. Independent testing is necessary in absence of manufacturer's test reports and re-testing unless so desired by the customer.
28. The flight envelope of commercial aircraft is different as compared to unmanned aircraft. Flight development means I'm talking about the V-n curve. Do we have any standard to demonstrate that a particular class of UAV must follow the same envelope?  
There is no standard specified. In simple terms, it is the boundaries of flight in limiting conditions of specified parameters.
29. Is the Vibration level requirement specified for UAS and are there any tolerances with respect to Vibration?  
Manufacturer / designer should specify in the respective document and demonstrate accordingly.
30. Is fatigue strength to be determined or is it only tensile/yield strengths only need to be demonstrated as per 5.1 of certification criteria?  
For primary structural elements, it should be the fatigue strength keeping Factor of Safety as mentioned.
31. In Certification criteria 10.4 (5), for compliance criteria of independently verified and validated reports, the exact requirement was not understood. Is it a controlled list containing all the hardware and software used in the product?  
Independent Verification and Validation commonly referred as IV&V is required to be done by a 3rd party. This is to verify both software & hardware to check that the product is built correctly and is capable to perform all intended functions and that it does not perform any unintended functions. To carry out IV&V, a test plan /test-cases covering all functionalities should be prepared. Software and hardware to be tested as per the test plan. Submission of IV&V report is a stage-1 compliance requirement.
32. In Certification criteria 10.4 (6), for compliance criteria of Material Manufacturing Record, the exact document to be submitted was not understood. Is it a controlled record indicating the source & method of procurement of all the components used in the product?  
The requirement is on providing Material Procurement Records duly authenticated by organisation authorised representatives. The intent is to record sources of supply and maintain consistency in quality of procurements.
33. Would integration document and stage-wise QC report be sufficient for compliance?

Yes, in case the fabrication method is established one.

### Technical | Battery

34. For R&D validation purposes, Manufactures have to import the different configurations of batteries from different OEMs. So getting BIS for every individual is challenging for manufactures. How can we ease that process?  
For R&D, compliance requirements in the scheme are little different. R&D is considered as an in-house activity which is out of the purview of the certification. However, for certification of any drone model, BIS registration of the battery would be required.
35. Has there been any guidance from MeitY on clarifying which class of UAVs (Nano, Micro, Small, etc.) would the BIS compliance for portable batteries be applicable to?  
As of now MeitY has not issued any separate guidance for UAV. The guidance is for Lithium batteries used in equipment. As per the guidelines, Lithium batteries should be BIS registered. Hence it applies to UAVs also.
36. Which branded batteries are already BIS certified which we can use directly by procuring them from the Manufacturer?  
This information is available on the BIS website. Manufacturers can choose the battery as per their requirements.
37. For BIS certifications, how many battery packs need to be submitted to NABL lab?  
This is as per BIS registration requirement and not part of the scheme.
38. If cell is BIS approved, do manufacture is still need to get Battery Pack certified?  
Yes. Registration of battery packs is required.
39. Should BIS certification be taken by importer or manufacturer of batteries? Drone manufacture should not be burdened with this certification.  
As per the scheme, batteries used in UAS should be BIS registered. Designating the responsibility of getting batteries registered to importer / manufacturer is beyond the scope of the scheme owner.
40. Is BIS Certification mandatory for batteries or lab test reports will suffice?  
BIS registration of batteries used in UAS is mandatory to avoid usage of substandard batteries/unreliable battery.

### Technical | Data Link

41. Can manufacture use an ETA Certificate taken by some other company for the same product or do manufacture have to take our own ETA Certificate for that product?  
It can be used if the make, model, frequency, power and other relevant parameters of the equipment are same and also it is mentioned in the certificate of the first applicant that "It may be utilized by another person(s) for import/usage purpose in India".  
If it is mentioned in the certificate that the ETA is for a particular make and model of UAV, then the certificate cannot be used for other make models of UAV.
42. For Data Link if manufacture use a license free band like 2.4 Ghz, do manufacture need any permission/license from WPC?  
Yes, ETA certificate from WPC would be required. 2.4 GHz is mostly used for indoor wireless applications like LAN, Cordless Phones etc. for a maximum power output of 1W in spread of 10MHz or higher.

43. Is ANTI COLLISION lights are not mandatory for any category of drone?  
Mandatory for night flying. For day flying it's optional.
44. How to determine the flight capability system in the data link?  
It's not a "flight capability system". Its data link capability which manufacturer has to specify as per the product parameters.
45. How to get the approval for TRANSMITTER and RECEIVER used in Drones?  
ETA Certificate from WPC DoT. Procedure mentioned in their website.
46. Which components require IS 13252 and IS 616 certifications?  
No component requires certification under IS 13252 and IS 616 standards. However, these standards could be used by the manufacturers as general safety guidelines for ensuring safety of electronics equipment, chargers, cable connections etc.
47. Do manufacture have marks associated during certification as there are various optional features like collision avoidance etc.?  
No marks or grading is awarded during certification for any optional features incorporated in the UAS Certification Scheme.
48. If all parts are imported from Taiwan or China, how to get them certified? Also, how about the Ground Control Software as all of them will be in Chinese and English Language?  
It is the manufacturer's prerogative to decide on import, country, buy or manufacture. Responsibility to get certification and details of the software from their suppliers for all applicable equipment intended to be used in the UAS lay with the manufacturer. The scheme owner has no scope to recommend in this regard.
49. For a data link test for all azimuth angles, what parameters are to be logged?  
All parameters of the drone that are monitored during flying including the parameters of the data link.

#### **Technical | Firmware and Hardware Tamper Avoidance**

50. Do secure firmware upgrades with new hashes need to be authorized by CB before upgrade, or should it just be communicated to CB?  
Any change to the certified firmware will void the certification. Prior authorization by CB is recommended to maintain validity.
51. Is the verification of checksum the only way to POST? Or is it one of the way?  
Power on Self-Test (POST) is a commonly accepted procedure to detect integrity of a system before use on powering up. Checksum comparison is the simplest of the techniques to see if software/firmware has been changed. If any other procedure is implemented, the onus of convincing the CB on acceptability of the method for preserving/detecting change in integrity of the firmware falls on the manufacturer.
52. Under Certification criteria 7.1, step 2 a. ii., code and data part's hash to be calculated separately. So the parameters of the flight controller come under data part of the firmware? If so, then manufacture have 50+ changeable parameters in which few might be changed before every flight (depending upon the scenarios). Now do manufacture have to calculate hash for every cases? Like manufacture have to perform permutations combination of the 50+ parameters and produce hash for every possible cases?  
Parameters used for compliance criteria are to be controlled. Variables used in flights are not included in this. Avoid getting into permutations of variables by including the

boundary values as the parameters and for flight, use variables which would be checked against the boundary conditions for compliance.

53. If every communication link going into the flight module is encrypted, is it necessary to have the data part in the firmware be digitally signed?  
Yes. Tampering without using communication link is also possible when UAS is on ground.
54. Can the POST of checksum of data part be done as pre arm check instead of having on boot?  
Should be acceptable. Demonstrate that it is happening to the CB.
55. If secure upgrade is implemented, how will POST be demonstrated? Because POST verification will involve upgrading in an unauthorised manner.  
In the manufacturer's site with a suitable test setup.
56. Is it recommended to protect the bootloader that is doing the POST test? Or, are we not at that level of protection?  
Need to have protection for bootloader else entire POST results can be spoofed.
57. Checksum for firmware of Flight controllers has to check only on firmware upload or every power on?  
Advisable to do it for every power on.
58. With respect to Hardware tampering, which modules would you consider as security critical – GPS or ESC or etc.?  
The registered flight module which is to function as root of trust is the most critical. Other modules are also relevant for security; their status can be checked by RFM once it is booted up.
59. Does the firmware checksum apply to the micro category as well?  
Firmware checksum (cryptographic hash) is also used as the identity of the firmware. CB would in fact refer to this identity in the certificate.
60. Does "verification key" here mean Public key?  
Yes, the Verification Key means the Public Key.
61. What is method and format for submission of checksum to CB?  
The checksum to be submitted to CB in document form or soft copy form.
62. Data part includes drone and mission specific data, which requires an update regularly on mission basis. Hence, data part checksum calculation is not feasible. Is checksum calculation for code part alone adequate?  
Checksum of the data part which contains Drone specific information and not the mission specific information should also be submitted. See answer to question 68.

### **Technical | Instruments / Equipment and Qualification Testing**

63. Wherever it's written "CBs to witness bench test", will the CBs witness the bench tests at NABL Accredited lab or an in-house bench setup?  
Tests that are to be carried out in accredited labs are generally mentioned in the scheme as "Lab Test". Unless specified, CBs shall not witness the tests in NABL accredited labs. CBs shall witness only the in-house bench setups and tests.

64. What about the certificate of the test bench where some in-house tests are to be done? Would self-certification work?  
No, self-certification won't work. Details of test benches are to be vetted by CBs for adequacy. If found adequate, CB shall witness the test or accept the test results. However, instruments used for monitoring / measuring parameters in the test bench should have a valid calibration certificate traceable to NABL or National/International standards.
65. What is the altitude from which the drop test is performed? Is the drop height (13-18" as you have mentioned) applicable for all classes of UAVs?  
There is no distinction between classes of drones. The drop test is for assessing the capacity of the shock absorbing mechanism.
66. What should happen if overcurrent/overheating is detected?  
System should have a mechanism to safeguard the motors and components when over current / overheating occurs.
67. The communication requirement between Flight Controller and a separate Flight Module needs 128bit symmetric encryption. Would that not be an overkill?  
The requirements are given in the scheme and compliance to the requirement as per the scheme is mandatory for certification.
68. If the flight controller is imported and cannot be customized as per DGCA requirements as software firmware is concerned, is there any other criteria to fulfil that requirement? Most of the flight controllers will be imported from China.  
No. It has to fulfil the certification scheme requirements.
69. Is there any company in India that manufactures Flight controllers or remote controllers?  
It is within the scope of the manufacturer's responsibility to check such availability in India. The scheme has no scope to suggest / recommend any brand, make, company, import, country etc.
70. If manufacture wanted to use an imported flight controller or remote controller and assemble a drone with structure and spraying assembly locally manufactured in India, then what is the procedure for certification?  
Same as given in the certification scheme.
71. Please elaborate how to test cruise parameters (stage 4)?  
Cruise parameters are to be decided and listed in the flight manual by the manufacturer. A test plan to be prepared to test these parameters. Testing to be carried out as per the test plan.
72. To what level should independence be verified? Is the independence in safety critical functions enough?  
Independence of software and hardware to be verified for mostly for flight as well as safety critical systems / functions.
73. ETA approval should be taken by the manufacturer of data link hardware. Why is drone manufacturer burdened with this procedure?  
Because it is the drone manufacturer who would decide, select and use the hardware. Accordingly, selection and design of data link hardware is with Drone manufacturers and so is the responsibility of manufacturer to get ETA for the hardware from WPC, DoT.



74. If someone is using 4G network as a data link and C2 link, do we still need an ETA certificate?  
ETA is for unlicensed bands. For licensed bands like the 4G, the network service provider should be having license to operate in the band being used for C2 link.
75. Can the predetermined strategy for C2 loss be RTH straight to home along the straight line path that joins home and current location?  
Recovery flight profile to be decided and programmed by the manufacturer. One possible way could be climb to maximum permissible height first and then follow the straight line path..
76. If UAS has a range in boundary conditions what is the acceptance criteria of CB.  
As specified by the manufacturer in the flight manual.
77. Can manufacture use a regular SIM card for terrestrial LTE? Or, are there special SIMs?  
Choice of SIM is with the designer/manufacturer.
78. How do manufacture plan for temperature/humidity and EMI/EMC test? Should it be done for components separately or UAV as a system?  
If UAV can be accommodated inside the test chamber, then the tests can be performed as a system. Else, the test is to be carried out for each component.
79. For Temperature, w.r.t IS 9000 Part 2 & 3, what should be the duration of the test, i.e., should it be 2/4/16/72/96 hours? Does the verification of test reports from an accredited testing lab submitted by the manufacturer for temperature carried out as per IS 9000 Part 2 & 3 or equivalent standard?  
Test to be carried out as per IS 9000 Part 2 & 3 or equivalent standard in an accredited lab. Temperature range, duration, test profile etc. to be specified by the manufacturer as per their design, role, operating environment and other parameters deemed important. Authenticated test report from accredited lab to be submitted.
80. For Humidity, IS 9000 Part 4, what should the duration of the test be, i.e., should it be 12/16/24 hours or 2/4/10/21/56 days? Is the verification of test reports from an accredited testing lab submitted by the manufacturer for humidity carried out as per IS 9000 Part 4 or IEC 60068-2-78 or equivalent standard?  
Test to be carried out as per IS 9000 Part 4 or equivalent standard in an accredited lab. Equivalent Standard is IEC 60068-2-78. Humidity range, duration, temperature, test profile, etc. to be specified by the manufacturer as per their design, role, operating environment and other parameters deemed important. Authenticated test report from accredited lab to be submitted. General recommendation is Humidity 93% at +40°C
81. For shock resistance, IEC 60068-2-27, what should the shock pulse (Half sine/Triangle/Trapezoid/Square), Pulse amplitude, and Pulse width be?  
Based on the design, specification, usage, life cycle etc. of the UAV, the manufacturer has to specify the shock test profile like pulse shape, duration, amplitude, number of shocks, axes etc. Test to be carried out on a vibration or shock table. A test plan with a test profile is to be prepared by the manufacturer and given to the lab. The lab shall carry out tests as per the test plan. Shock test to be carried out without packing case.
82. For EMI/EMC test: (Radiated Immunity) IEC 61000-4-3, what should the frequency range (80MHz-1GHz/ 1GHz-3GHz/ 80MHz-3GHz) and level (1V/m/ 3V/m/ 10V/m) be? Is the verification of test reports from an accredited testing lab submitted by the

manufacturer for Radiated Immunity carried out as per applicable Parts and Clauses of IEC 61000 / IS 14700 or equivalent standard?

Yes. Based on the design, specifications like sensitivity, electrical bonding, electronics circuit, filters used etc. manufacturer has to specify the frequency ranges for testing and acceptance limits.

Considered recommendations:

Frequency Range: 80 MHz to 3 GHz

Level: 1V/m

Since the UAS uses internal power from the battery, only sub-clause IEC 61000-4-3 is considered applicable. IS 14700 is equivalent to IEC 61000.

83. Testing labs need more clarity on battery testing; for e.g. min. and max. Temperature range, etc.  
Manufacturer has to specify range and acceptance criteria as per design and specification of the Drone. Any clarity on the test profile to be clarified by the manufacturer.
84. Certification criteria 9.3 b., if the Flight Controller is in a closed loop system dependent on sensor fusion, how does the Statement of Independence between software components fit here? Does that mean Unit Testing/Integration Testing of the software?  
Yes. Testing of software as well as hardware.
85. Are flashing anti-collision strobe lights necessary, even though UAS operations are limited for agriculture spraying 30m height (AGL) in VLOS range and not flying in controlled airspace?  
Anti-collision lights are a safety requirement and hence considered most desirable. However, as per certification standards, it is mandatory for night operation and optional for day (only) operation.
86. Opinion: Certification should have categories like A+/A/B/C depending on UAS features mainly on optional features like Collision Avoidance, ADS B- Out, Strobe light, etc. to ensure high grade.  
UAS certification scheme has no provision or scope for awarding categories or grading during certification. The optional features are for differentiating the product from customer point of view.
87. In Certification criteria 9.1, (a), the Effects of voltage spikes from power source should the verification of testing required from the accredited testing lab, if the power source is battery only?  
No. Not necessary. Manufacturer to submit a comprehensive technical analysis report on power budget and consumption pattern by various loads including payloads at various flight conditions and conclusively bring out that there is no possibility of occurrences of voltage spike.
88. Different components have different envelopes; for example, motors especially can have different max temperature and humidity range. Do manufacturers need to submit test reports of these individual components or the entire assembled UAV as a whole or both?  
Range / limits for environmental testing should be decided as per the temperature and humidity range / specification of the final product (in this case the drone) and required safety margin. If the UAV can be accommodated inside the test chamber, the test can

be performed with UAV as a whole. Else individual components / assemblies are to be tested separately.

89. What is the purpose of RFID in the given line item and how is it to be tested? Would just an RFID sticker suffice for this? And if so, is any interface required with the GSM module or would compliance also be given if the RFID & GSM are separate subsystems?
- RFID is to store and give information regarding the drone like Registration No, manufacturer, Owner, Operator etc.
  - Functional test to be done with the help of a RFID reader.
  - Any RFID shall suffice the purpose.
  - It can be independent or interfaced with the GSM module.
90. Is it adequate to have a provision for GSM alone for complying with this criteria?  
Both RFID and GSM are individually optional.
91. Can you explain role of RFID and GSM module, in Certification criteria i, 8.1, its role and purpose and CB tests?
- However, as per the certification standards, RFID and GSM Sim is optional. In future, these means may be used for live tracking of UAS.
  - If installed, general operation and verification of its function is within the scope of evaluation by CB.
92. Is the design life cycle test as per EMS?  
No, not as per EMS. There is no design life cycle test as such specified in the scheme. Verification of Hardware design life cycle has been kept through verification of manufacturers established quality control procedure.
93. Is the design life cycle of hardware (Certification criteria 9.4) determined as per ISO 14001?  
It is not mandatory to follow ISO 14001.
94. How do we prove the adequate electrical energy requirement?  
This is the responsibility of the designer / manufacturer.  
Nevertheless, one of the methods could be by analysing and calculating the current drawn by various on-board loads including payload at their maximum limits and then adding a safety margin.
95. On the strobe lights point, there was a mention of it being mandated in UAS Rules, however I am unable to find a mention of the lights being mandatory in the Drone Rules 2021. Would Manufacturers still be bound by this line item given its exclusion in the revised rules?  
As per certification standards, Anti Collision / Strobe light is optional for day and mandatory for night operation.
96. As per conversation with the local RLO of WPC, they are not issuing a separate license for 1090 Mhz, they usually give an overall license for the entire Aircraft when it comes to civil aviation. In addition to this, and the fact that ICAO themselves have dissuaded states from mounting ADS-B out on UAS (<https://www.icao.int/NACC/Documents/Meetings/2019/ADSBOUT/ADSB-OUT-M-IP04.pdf>) and also the fact that there are currently no guidelines in place as per my knowledge for transmission messages on this frequency, how will the implementation of this component be tested?

Implementation of this component can be tested in liaison with Civil ATC. However, liaising Civil ATC is within the scope of manufacturers' responsibility.

97. Is ADS-B OUT required for operating a Small Category UAS in uncontrolled airspace? All UAS operating above 400 feet (120 m) AGL shall be equipped with SSR transponder (Mode 'C' or 'S') or ADS-B OUT equipment.
98. Is there any specific test procedure for environment tests because NABL accredited lab does not have any such?  
Preparing test procedure / test plan / test profile is not within the scope of the LAB. Test procedure, test plan, test parameters, limits, acceptance criteria etc. to be prepared by the manufacturer as per the design and specification of the product. Lab will conduct the test as per the test plan and test profile.
99. Please mention testing criteria's or parameters for actuators/servo controllers, etc.  
No testing criteria for these components has been specified. Manufacturer/designer has to decide which all parameters / specifications are to be tested to ascertain reliable operation / functioning of these components. Accordingly, the manufacturer has to prepare a test plan to test these components for verifying these parameters during ground test or flight test.
100. Will relay nodes and/or mesh networks be accepted for the certification process?  
Acceptance of such networks are on case to case basis.
101. In Certification criteria 9.1, a), the Effects of voltage spikes from power source should the verification of testing required from the accredited testing lab, if the power source is battery only?  
No. Not necessary. Manufacturer to submit a comprehensive technical analysis report on power budget and consumption pattern by various loads including payloads at various flight conditions and bring out that there is no possibility of occurrences of voltage spike.
102. Geo-fencing has been mentioned as a mandatory line item for the certification scheme, however as per my understanding of the revised Drone Rules 2021, geo-fencing is a feature that may be notified in future. Given this understanding, would this line item only be tested once the Central Government notifies Geo-fencing as a mandatory safety feature?  
As per Certification standards, Geo-fencing is mandatory.
103. Does CB test the Geo-fencing feature also as per the Certification Scheme?  
Yes.
104. As part of the certification process, will CB also verify the correct operation of the geo-fence checking algorithm, in all cases? or simply check that 1 Hz check of some form is happening?  
Besides verifying the 1Hz check being reflected in the log files, CB would check the behaviour of UAS on boundary violations or breach of geo-fence in flight tests.
105. From a POV of a security loophole, it may be possible to fool a badly implemented geo-fencing. Should the CB verify that?  
Yes. CB shall check for correct implementation of geo-fence.
106. Under Certification criteria 9.3, do the firmware of BMS, etc. should be considered in calculating independence, as they come under software category?  
All software used shall be checked for its independence.

107. What is IV&V compliance and what should the manufacturer do to demonstrate this?  
IV&V is independent verification and validation carried out by a 3rd party. It is a comprehensive review, analysis, and testing of software and hardware performed to confirm / verify that the product requirements are correctly defined, and that the system is correctly implemented for its intended functionality and security requirements. IV&V report is to be submitted for verification.
108. Is there a standard guideline to ensure independence between software components from function and design point of view?  
No, there are no standard guidelines or flow chart or template available. However, as designer, the manufacturer has to design the same and carry out necessary analysis of their product and establish that the software components used for various equipment / functionalities are independent from a safety and reliability point of view.
109. Since the UAS is always transported in a carry case, would it be sufficient to carry out the shock test with the transportation case containing the UAS?  
No. The shock test is to be done on the specimen, i.e., UAS in unpacked condition or without packing / transportation case. The test is to be carried out as per the provisions of IEC 60068-2-27.

### **Payload**

110. What if the operator wants to integrate a new payload under guidance of the manufacturer but it was not listed during initial Certification which was done by manufacturer, does the payload be of the same category as declared by manufacturer?  
After the initial design approval by the design approving authority-DGCA, any upgrade, change to the product resulting in design and configuration changes should be submitted to the authority for approval of the changes. As far as certification is concerned, CB will verify compliance with respect to the changes incorporated and the certification will remain valid.
111. Is swappable payload allowed or not?  
All applications of payload(s) should be included in the initial request for certification. However swappable payload doesn't make appreciable changes in the configuration of UAS.
112. Based on the AUW, the thrust to weight ratio varies so if you increase the AUW the ratio automatically varies and hence affects the performance of your quad.  
That is why, performance is calculated based on Max AUW as well.
113. To consider 1.5 safety factor is for hover thrust or for maximum thrust?  
Max Thrust.

### **Scheme, Certification and Testing**

114. What should be the base for manufacturers to declare self-certification?  
Self-certification of the drones by the manufacturers is not envisaged in the scheme. However certain parameters shall need to be determined/checked by the mfr and make a declaration to that effect. Critical amongst these parameters shall be reverified/validated by the CB during the certification process.
115. The tests mentioned for CB are to be done on all categories of Drones, viz. Micro, Small, and Medium category? Or any category is exempted from these tests?  
Yes. No distinction in scheme for different categories.

116. If UAS is so useful then why does the Indian government place this much restriction on manufacture?  
There is no restriction on manufacturing as such. However, it is utmost important that any product manufactured has to meet minimum safety standards to ensure safety of the people product and the aviation ecosystem.
117. Once the product has passed the Certification and already out in the market, and if we have a new firmware update what is the next step do we again need the certification as it is just a firmware update on the existing version  
Delta certification would be required depending upon the extent of change/update.
118. From the RPTO point of view, what types of repairs need to be reported? During training flights, chances of small component damage is fairly high, i.e., change of propellers, motors or ESCs.  
It is a good practice to document all types of repairs carried out and retain records. Flow down of this information to the manufacturer is necessary for continuous improvement of the product quality and performance. If you mean reporting to DGCA, the requirement is all UAS holders shall maintain maintenance records and, should be able to produce on demand by DGCA.
119. After Certification, if a manufacturer wants to add additional models, again initial certification (stage 1 and stage 2) to be followed?  
Yes.
120. What happens in the case when parts, components, software need to be upgraded, changed? Is there a new certification process from beginning or only for that part or not necessary?  
After the initial design approval by the design approving authority-DGCA, any upgrade, change to the product resulting in design and configuration changes should be submitted to the authority for approval of the changes. As far certification is concerned, CB will verify compliance with respect to the changes incorporated and the certification will remain valid.
121. Where can we get list of NABL accredited labs for different components? Is there any helpline who can support in the process?  
NABL accredited labs can be found on official website (<https://nabl-india.org/>)
122. When we talk about independent witness testing by CB, in case of NABL lab unavailability, can you put more light on compliance to check at manufacture lab?  
In case of unavailability of NABL Lab, try find a Government approved or DGCA or DGAQA (Directorate General Aeronautical Quality Assurance) approved lab. In the event of unavailability all these approved labs, the tests can be performed at the manufacturer's lab. For this you need to ensure the test bench and all the instruments/ gauges attached to the test bench are calibrated at an approved lab, maintain all calibration certificates, have documented test procedure and a format to record test results. Provide basic training to people conducting the test and maintain their training records. The tests can be demonstrated to the CB during onsite assessment.
123. Is there any separate approval to be done for manufacturer lab with respect to standard applicable for lab?  
As far as labs are concerned, they can be grouped into two categories namely "Captive Lab" and "Test House".  
A captive lab is a full-fledged lab within the manufacturer's facility without a NABL approval, this lab can perform testing for their own products, and they are not entitled to perform any test and release / issue a test report for any outside company.

A Test House is an independent and NABL approved lab carrying out only inspection, calibration and testing functions for manufacturer's products and they are authorised to release/issue test reports which are acceptable to customers, government, certification bodies and regulatory authorities. Majority of the manufacturers prefer to test their products at NABL labs rather than investing for in-house test setups. ISO 17025 is the international standard for testing and calibration laboratories. It's a set of requirements those laboratories use to show that they operate a quality management system and that they're technically competent to do the work that they do. All NABL approved labs are certified to ISO 17025 standard.

If you get your Captive Lab NABL approved, you would have two benefits: 1. you can perform testing on your products and issue test report which would be acceptable to CB, CB may not insist for testing it again in their presence. 2. You would be entitled to perform testing and issue test report for products of other manufacturers, adding revenue to your business.

124. In future, is there a plan to have designated labs for independent testing instead of allowing self-tests on-site? Will there be separate approval process for such independent labs or any NABL accredited lab will be allowed?

As far as labs are concerned, they can be grouped into two categories namely "Captive Lab" and "Test House". A captive lab is a full-fledged lab within the manufacturer's facility without a NABL approval, this lab can perform testing for their own products, and they are not entitled to perform any test and release / issue a test report for any outside company. A Test House is an independent and NABL approved lab carrying out only inspection, calibration and testing functions for manufacturer's products and they are authorised to release/issue test reports which are acceptable to customers, government, certification bodies and regulatory authorities. Majority of the manufacturers prefer to test their products at NABL labs rather than investing for in-house test setups. ISO 17025 is the international standard for testing and calibration laboratories. It's a set of requirements those laboratories use to show that they operate a quality management system and that they're technically competent to do the work that they do. All NABL approved labs are certified to ISO 17025 standard.

125. How to go about testing unconventional drone designs? Will the same rules apply? Yes, same rules will apply for testing unconventional drone designs.

126. If the manufacturer has multiple locations (Design office, Manufacturing location etc.), all location shall be included in the certification? If some of the processes are outsourced (design, fabrication, sub-assembly etc.) the audit scope of limited to manufacturer or it is extended to the outsourcing suppliers too?

You should clearly mention these locations, the work carried out and show it on company organisation chart and their link to the ultimate organisational head responsible for business execution. During the initial assessment all locations will be audited to for their function. As far outsourcing is concerned, it is the responsibility of the supplier to control its sub-tier suppliers and the process of control to be defined in supplier's QMS, CB will verify compliance to this procedure. Please note that outsourcing work to another organisation does not absolve supplier of the responsibility to provide acceptable products.

127. Is there a list of approved third party test vendors which we can contact? No such list is available. It is the responsibility of the manufacturer to find and arrange 3rd party test vendors.

128. If we assemble a drone, then also we need all the tests/certification?

It depends on the purpose of operation and size.

129. Is there any certified components list?  
No. Component list to be prepared by the manufacturer as per category, design, specification, payload etc. of drone.
130. Can we upload the design documents (para-wise) in the analysis report section as no separate portal is there to upload design documents?  
No. Design document is to be submitted to CB
131. As a farmer producer company what things need to be checked from UAV manufacturers?  
Providing any advice on this is beyond the scope of scheme owner's responsibility. However, specification, capability, role etc. could be checked against requirements of the farm producer company.
132. Can QCI/DGCA give us a draft document required to be submitted for certification? It will help us write the documents and speed up the certification process.  
There is no scope for draft or sample document within the purview of certification scheme. It is the responsibility of the manufacturer to design documents for their product that meet the requirement of certification.
133. What's the type of approval for conceptual and development drones by a start-up?  
Approval requirements for conceptual and developmental drones wherever applicable, are given in the part VIII of Drone rules.
134. Any specific certification requirements for BVLOS operations?  
BVLOS certification requirements are under preparation and shall be released in due course of time.
135. What is the procedure for demonstrating datalinks for BVLOS operations?  
BVLOS certification requirements are under preparation and shall be released in due course of time.
136. Which accredited lab can certify Autopilot systems?  
As per scheme, the autopilot system does not have the requirement of lab certification.
137. At what stage lab certifications are required for various components?  
Lab certification, wherever required, is mentioned against the applicable clauses in the certification scheme.
138. In the case of drones having more safety features, there should be some safety rating like automobile for Ex-NCAP rating.  
The present Drone rules and certification scheme has no scope for rating or grading of drones.
139. Who should be digitally signing the company documents (PAN, GST etc.) to upload on the digital sky platform?  
Company(Applicant/Manufacturer) to decide and designate the authorised signatory.
140. Any incident or accident could take place either due to malfunction in the system, due to pilot error and due to change in weather parameters not ascertained or paucity of time to abort flight. Further the failure may lead to catastrophic effect or may not in all the cases as manufacturers would need to find the reasons from the storage data for further improvement in the system.



Yes. Analysis of every failure both in-house and customer feedback is very much needed for continuous improvement of supplier's processes, products and system.

141. Is it good-to-have or a must requirement for suppliers to have a standards based QC management process? Can they have a custom QC process?  
Suppliers can have their own documented Quality Management System (QMS) in reference to any International Standard such as ISO 9001 or AS 9100 or regulatory standards such as Civil Aviation Requirements of DGCA, Federal Aviation Requirements of FAA, etc., and demonstrate compliance to their own QMS. However, Third Party Certification for either ISO 9001 or AS 9100 is not a requirement at present.
142. How foreign manufacturers export UAS to India without certification from CB/DGCA? If the UAS is procured from a foreign company, in that case what will be the procedure  
Please refer [Rule 10 &11 of Drone Rules, 2021](#)

**Note: These FAQs are compiled to help the applicant in obtaining more clarity on various requirements mentioned in the UAS Scheme. In case of any perceived ambiguity arising out of the FAQ text, UAS Scheme text shall prevail.**