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OFFICE OF THE DIRECTOR GENERAL OF CIVIL AVIATION

DRONE MANUFACTURING CIRCULAR **ISSUE: 01**

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Subject: Guidelines to manufacturers for obtaining a type certificate in respect of an unmanned aircraft system (<150 kg) and for making changes/ modifications to already type certified UAS model

1. Introduction

1.1 Rule 6 requires the operator to ensure that the unmanned aircraft system a.k.a. Drones conforms to a type certificate or is exempted from the requirement of type certificate.

1.2 The Type Certificate for the UAS/ Drones is issued by DGCA under the Rule 8 & 9 of the Drone rules, 2021[1] on the basis of test reports and recommendation in the form of statement of conformity from an authorized testing agency for a particular type of UAS model.

1.3 Type certification ensures the design of the aircraft and its parts, including propellers, engines, control stations, etc. meets applicable airworthiness criteria specified in the Certification Scheme of Unmanned Aircraft System issued vide S.O.347(E) dated 26th January, 2022.

1.4 An applicant of Form D-1 of the Drone Rules, 2021 after obtaining a Type Certificate from DGCA becomes an approved UAS manufacturer of particular type of UAS. The Type certification of an UAS enables the manufacturer to produce 'n' number of UAS of same type.

1.5 This circular contains guidance for the prospective UAS manufacturers for obtaining a Type Certificate in respect of a particular UAS model under the Drone Rules, 2021 and for the type certificate holders for carrying out any changes/modification to an already type certified UAS model.

2. Applicability & Scope

2.1 This circular is applicable to any person intending to manufacture a drone under the Drone Rules, 2021 and existing DGCA type certificate holder.

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[1] https://www.dgca.gov.in/digigov-portal/?page=jsp/dgca/InventoryList/RegulationGuidance/Rules/The%20Unmanned%20Aircraft%20System%20Rules/Drones%20Rules%202021.pdf

3. Acronyms

ATE	-	Authorised Testing Entity
MTOW	-	Maximum Take-off Weight
TC	-	Type Certificate
TCH	-	Type Certificate Holder
UAS	-	Unmanned Aircraft System
UIN	-	Unique Identification Number
VLOS	-	Visual Line of Sight Operation

4. Definitions

Authorised testing entity *means an entity authorized by the Director General or the Quality Council of India for the purpose of testing unmanned aircraft system for type certification.*

Drone *means an unmanned aircraft system;*

Maintenance *means the performance of tasks on unmanned aircraft system required to ensure its continuing airworthiness including any one or combination of overhaul, inspection, replacement, defect rectification, and the embodiment of a modification or repair;*

Manufacture *means the performance of tasks that involve assembly or production of unmanned aircraft system in conformity with its applicable design including prototype.*

Explanation,- For the purpose of this clause, "design" means the set of data and information that defines the configuration of an aeronautical product type, its associated parts and appliances for the purpose of airworthiness determination.

Modification *means any change (other than repair) to the approved type design (type certificate)*

Prototype unmanned aircraft system *means an unmanned aircraft system developed for the purpose of research and development or obtaining a type certificate.*

Remotely piloted aircraft system *means a remotely piloted aircraft, its associated remote pilot stations, the required command and control links and any other components as specified in the type design.*

Repairs *are the result of design/ maintenance activities for the elimination of damage and/or restoration of the UAS to an airworthy condition.*

Scheduled Maintenance. *Any maintenance task that has a deadline is considered scheduled maintenance. It might be a one-time task or a recurring task completed on a regular basis. E.g. preflight, postflight, daily, monthly etc.*

Type Certificate *means a certificate issued by the Director General or any other entity authorized by the Director General, certifying that the unmanned aircraft system of a specific type meets with the requirements specified under these rules;*

Unmanned Aircraft System *means an aircraft that can operate autonomously or can be operated remotely without a pilot on board.*

5. Type Certification Process

5.1 Certification Basis/ Certification Criteria

5.1.1 The type certification criteria for UAS upto 150 kg (MTOW) is notified in the Certification Scheme for UAS vide S.O.347 (E) dated 26th January, 2022. (Refer Part 3 of the Certification Scheme for UAS[2])

5.2 Application

5.2.1 Any person intending to obtain type certificate from DGCA for their UAS model must acquaint themselves with the rules, regulations, certification scheme for unmanned aircraft system and other relevant requirements in vogue and prepare the applicable supporting documents for their application for type certification. Template for documents to be submitted is included in the Annexure I to help applicants in drafting various supporting documents to the Form D-1 application.

5.2.2 Any person intending to obtain a type certificate shall make a duly filled application Form D-1 on the eGCA webportal along with the fee of ₹100/ - and relevant supporting documents.

5.2.3 The applicant has the discretion to choose any authorised testing entity (ATE) while making the application Form D-1. The ATE will examine (evaluate) the proposal and submit the test reports along with its recommendations to the Director General.

5.3 Evaluation & Certification

5.3.1 The evaluation process will be carried out by ATE chosen by the applicant in two stages (Refer Part 4 of the Certification Scheme for UAS[3]):

5.3.2 After satisfactory completion of evaluation by the ATE, the ATE communicates its recommendations for issuance of type certificate for the particular UAS model to DGCA in the form of Statement of Conformity (SoC) along with supporting documentations, refered as *SoC package*.

5.3.3 On the basis of Statement of Conformity received from the ATE and on being satisfied with evaluation of the application and SoC package forwarded by ATE, DGCA will issue type certificate to the UAS model.

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[2] https://egazette.gov.in/WriteReadData/2022/232917.pdf

[3] https://egazette.gov.in/WriteReadData/2022/232917.pdf

5.4 Type Certificate

5.4.1 The type-certificate will include the type design, the type certificate data sheet for airworthiness & environmental protection, C2 link, RPS, frozen manual, the operating limitations and other limitations & conditions.

5.5 Validity

5.5.1 A Type Certificate is issued for an unlimited period. It remains valid subject to:

a) the holder remaining in compliance with the type certificate and type cerificate data sheet (including the limitations and conditions specified therein); and
b) the certificate not being suspended or cancelled by DGCA

6. Post Type Certification Process – Production, Privileges and Obligations

6.1 Publication

6.1.1 The type certificate when issued by DGCA will be populated on the DGCA web site.

6.1.2 After issuance of the TC by DGCA, the applicant becomes the type certificate holder and the approved manufacturer of the particular UAS type. The TCH is required to show compliance to the obligatory requirements of a manufacturer as per Para 6.3.

6.2 Record keeping

6.2.1 All the relevant design information, drawings and test reports, including inspection records for the particular UAS model tested, should be held by the TCH of that particular UAS model in order to provide the information necessary to ensure the continued airworthiness of the UAS mode throughout its entire service period.

6.3 Obligations

The type certificate holder shall ensure continued compliance with the applicable provisions of the Drone Rules, 2021, the Certification Scheme for UAS (CSUAS) and the limitations and conditions specified in the Type Certificate issued by DGCA for the specific UAS model.

7. Changes/ Modifications

7.1 Changes / Modifications

7.1.1 Any TC holder intending to carry out any changes/ modification in a type certified drone/ UAS shall classify such changes as Level 1, 2 & 3 as per Para 7.1.2.

7.1.2 The processing of approval of such modification changes/ modification/ amendments will depend on the levels of modification and is as specified below.

Level 1 – Minor modification is a change that has no appreciable effect on the mass, balance, structural strength, reliability, operational characteristics, noise, fuel venting, exhaust emission, or other characteristics affecting the airworthiness of the product.

Such changes will be allowed to be carried by TC holder for aspects that doesn't impinge in the safety and security of the Drones with prior intimation (self-declaration) to the DGCA/ ATE. The change will be considered as an update to the type certified drone.

Level 2 - Major modification are non-Substantial Changes. In case of these changes, delta Certification process will be followed i.e. only affected clause(s) of the CSUAS will be evaluated for compliance. For the unaffected clause(s) of the CSUAS, the applicant may claim credit from the compliance shown for the original type certified model. The TC holders need to approach the ATEs who will assess the changes and submit their recommendation or otherwise to the DGCA for changes in the Type Certificate. The change will be considered as variant of the type certified drone.

Level 3 - Major modification are the Substantial Changes of Type Certified UAS. The submissions that impinge upon the safety and security of the Drones shall be reviewed by ATEs which shall advise the manufacturer to apply for a New Type Certificate application intimating DGCA of the decision. The change will be considered as new type.

Note. – Refer Annexure II for indicative list of modifications for each Level. The TCH must maintain record of any changes made to the type certified UAS/ Drones.

7.1.3 Repairs/ Replacement of manufacturer approved parts/ components/ equipment that does not violate the type certificate is allowed to be carried out by a user or by anyone only when is appropriately trained & authorized by the manufacturer for that particular task. Such replacement is not considered as change / modification.

Note. - The TCH shall report to DGCA of any unauthorized modification, hardware or software tampering by the user as and when it comes to their notice.

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Annexure - I

List of the supporting documents to be submitted for TC application

Document Master List	
No.	**Document Title**
A	Design Document
B	Independent Verification and Validation
C	Software Security Requirements
D	Internal Ground Test Reports
E	Internal Flight Test Reports
F	Third Party Test Reports
G	Manufacturing Manual
H	Quality Assurance Manual
I	Standard Operating Procedures
J	Manufacturer Level Maintenance Manual
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L	Flight/User Manual
M	Failure Mode and Effect Analysis
N	Bill of Materials (as per Template provided by QCI for agri drones)

A. Design Document

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4.2.1. Justification for Decision Time	6.1 (d)
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4.2.3. Behaviour of UAS at RTL	6.1 (d)
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4.3.1. Justification for Decision Time	6.1 (d)

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4.4.1. Justification for Decision Time	6.1 (d)
4.4.2. Exact Aural and Visual Signature	6.1 (d)
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F. Third Party Test Reports

Name of the Test	CS-UAS Part 3 Clause Reference	Requirements	Governing Standard
1. Environmental Tests			
1.1. Temperature Test (Cold Test)	9.1(c)	Drone with controller and battery (01 piece required)	IS 9000/IEC 60068
1.2. Temperature Test (Dry Heat Test)	9.1(c)		IS 9000/IEC 60068
1.3. Humidity Test	9.1(c)		IS 9000/IEC 60068
1.4. Shock Test	9.1(d)		IEC 60068-2-27
1.5. IP Test (Optional)	9.1(e)		IS/IEC 60529
2. EMI/EMC Testing			
2.1. EMC Immunity Test	9.2	Drone with controller and battery (01 piece required)	IEC 61000-4-3
3. Battery Testing			
3.1. Battery life cycle test (Up to 80% DoD)	1.5(iii)	Drone battery (02 piece)	IS 16046 and IS 16047
3.2. BIS Testing and Compliance*	3.2	Battery (22 pcs)	IS 16046-2:2018
4. UIN Plate Testing			
4.1. UIN Plate material grade identification test	5.4(a)	Drone UIN plate (01 piece)	ASTM E-1251-2017
4.2. UIN Plate fire retardant test	5.4(a)		IEC 60695-11-5
5. Material Testing			
5.1. Material grade identification test	5.1 (b)	Thermo Plastic, Aluminum, Carbon fiber	ASTM E-1251-2017
5.2. Tensile Test (Without Conditioning)	5.1 (b)		ASTM D3039
5.3. Compression test (Without Conditioning)	5.1 (b)	Carbon fiber	ASTM D3410
5.4. Flexural Tests (Without Conditioning)	5.1 (b)	Carbon fiber	ASTM D790
5.5. Ageing at -10 °C for 12 Hours	5.1 (c)	Thermo Plastic, Aluminum, Carbon fiber	IS 9000 (Part 2/Sec 3)
5.5.1. Tensile Strength (Post Ageing)	5.1 (c)		ASTM D3039-2017
5.6. Ageing at 40°C and 90% Rh for 12 Hours	5.1 (c)		IS 9000 (Part 4)
5.6.1. Tensile Strength (Post Ageing)	5.1 (c)		ASTM D3039-2017
5.7. Ageing at 55°C for 12 Hours	5.1 (c)		IS 9000 (Part 3/Sec 3)
5.7.1. Tensile Strength (Post Ageing)	5.1 (c)		ASTM D3039-2017

G. Manufacturing Manual

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1.3. Manufacturing Process Flow	5.2 (a)
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2. Sub-Assembly Procedures	5.2 (a)
3.1. Airframe Sub Assembly	5.2 (a)
3.2. Propulsion Sub Assembly	5.2 (a)
3.3. Landing Gear Sub Assembly	5.2 (a)
3.4. Avionics Sub Assembly	5.2 (a)
3.4.1. Accelerometer calibration	5.2 (a)
3.4.2. Magnetometer calibration	5.2 (a)
3.4.3. GPS calibration	5.2 (a)
3.4.4. ESC calibration	5.2 (a)
3.4.5. Radio calibration	5.2 (a)
3.5. Payload Sub Assembly	5.2 (a)
4. Special Processes	5.2 (b)
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4.2. Work Instructions	5.2 (b)
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5.2. Tamper Protection Mechanism	7.2
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H. Quality Assurance Manual

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1.4. Organogram	5.2
1.4.1. Roles and Responsibilities	5.2
2. Fabrication Process Flow	
2.1. Flowchart Description	5.2
2.2. Types of Inspection	5.2
2.3. Instruments Used for Quality Checking	
3. Quality Control Stages	5.2
3.1. Quality Check Process After Procurement	5.2
3.1.1. Quality Check Process of the Electronics Components	5.2
3.1.2. Quality Check Process of the Mechanical Components	5.2
3.2. Quality Control: Sub-Assembly Level	5.2
3.2.1. Airframe Sub Assembly	5.2
3.2.2. Propulsion Sub Assembly	5.2
3.2.3. Landing Gear Sub Assembly	5.2
3.2.4. Avionics Sub Assembly	5.2
3.2.5. Payload Sub Assembly	5.2
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3.4. Quality Control: Special Processes	5.2
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3.5.1. Final Assembly Check	5.2
3.5.2. All Software/firmware integration check	5.2
3.5.3. Flight Test	5.2
3.5.4. Certificate of Conformity	5.2
3.6. Quality Control: End of Life	5.2
3.6.1. User Level	5.2
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4. SOPs	5.2
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4.2. SOP for generation, issuance and transfer of UIN	5.2
4.3. SOP for applying Void Sticker	5.2
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5.1. Supplier Information Format	5.2
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5.3. Goods Received Record Format	5.2
5.4. Rejected Material Record Format	5.2
5.5. Inventory Management System Process	5.2
5.6. Job Card Format	5.2
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5.7. Final Assembly Report Format	5.2
5.8. Certificate of Conformity Format	5.2
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1.2. SOP for applying Loctite (thread locker)	
1.3. SOP for using Wire Tie	
1.4. SOP for applying Araldite	
1.5. SOP for using Dual Sided Tape	
1.6. SOP applying Void Sticker	
1.7. SOP for applying heat sleeves	
1.8. SOP for Special Processes	
1.9. SOP for fixing UIN Plate	
1.10. SOP for serial number creation and procedure for part number creation.	
1.11. SOP for issuance of UIN	
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3. Operations	
3.1. SOP for night flying	
3.2. Maximum Range at night	
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4. Software	
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4.2. SOP to update GCS software	
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5.1. SOP for Bench tests	
5.2. SOP for Mounting Propeller	
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6.1.2. SOP to change receiver	
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6.1.7. SOP for changing GNSS Module	
6.1.8. SOP for changing canopy	
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6.1.11. SOP for changing PPK Antenna	
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J. Manufacturer Level Maintenance Manual

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1.2. Preventive maintenance	
1.3. Maintenance Flow Chart	
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1.5. List of Tools Required	
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2.1. List of Critical Components	5.3 (a)/ 10.2
2.2. Component Monitoring Process	5.3 (a)/ 10.2
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3.2. Procedure to inspect payload	10.2
3.3. Procedure to inspect external antenna	10.2
3.4. Procedure to inspect motors and propellers	10.2
3.5. Inspection Checklist	10.2
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4.1. Procedure to inspect engine	10.2
4.2. Procedure to inspect battery	10.2
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4.2.2. Maintenance of Battery	10.2
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6.2. GPS calibration	10.2
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7.9.7. SOP for changing GNSS Module	
7.9.8. SOP for changing canopy	
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7.9.11. SOP for changing PPK Antenna	
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K. User Level Maintenance Manual

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2.1. Scope of Maintenance [User level, MRO level, Manufacturer level]	10.2
2.2. List of Tools Required for Maintenance	10.2
2.3. User Maintenance Flowchart	10.2
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2.8. Procedure to Inspect External Antenna	10.2
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L. User Manual

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2.1. Company Information	
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2.3. Dos & DON'Ts (Regulatory Compliance)	
2.4. Warnings, Cautions & Safety Notes	
3. Package contains	
3.1. Name of each components in Aircraft	
4. Performance Parameters	
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7.2. Return-To - Launch (RTL) procedure	
7.3. Status Indicator	
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8. Calibration procedures	
8.1. Accelerometer calibration	
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11.1. Mission Planning Procedure	10.1
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12.1.1. Justification for Decision Time	10.1
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12.2.1. Justification for Decision Time	10.1
12.2.2. Exact Aural and Visual Signature	10.1
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12.3.2. Exact Aural and Visual Signature	10.1
12.3.3. Behaviour of UAS at RTL	10.1
12.4. Flight test proving RTL is triggered in case of breach of geofence	10.1
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Annexure- II

Indicative List of Modification and their Levels

S/n	Modification	Level of Modification
1.	Changes in the SOP, internal procedure, fabrication manual or other manual submitted during the TC(not covering manual which leads to change in flight manual, maintenance manual)	Level 1
2.	Elaboration of procedures (in-house)	Level 1
3.	Paint colour changes (not affecting the MToW, Size etc.)	Level 1
4.	Changes that not affect the TC	Level 1
5.	Changes in flight manual, maintenance manual	Level 2
6.	Changes in the Software/ Firmware version of GCS/FCM.	Level 2
7.	Addition of Swappable/ compatible payloads (without changing the configuration)	Level 2
8.	Change of battery/ Motor/ propeller/ BMS/GNSS of same specification from different OEM	Level 2
9.	Change of Flight Control Module	Level 2
10.	Addition of seed broadcaster (for existing spraying agri drones)	Level 2
11.	Changes in the component of payload(like pump, tank, etc) of same specification from different OEM	Level 2
12.	Addition of intended application remote pilot training	Level 2
13.	Change of form/ shape, configuration	Level 3
14.	Changes in UAS Airframe (Structure) in Weight (MToW) of the UAS.	Level 3
15.	Deviation in C.G limits.	Level 3
16.	Deviation in Endurance and / or Range.	Level 3
17.	Change of payload/ intended application other than specified in TC.	Level 3
18.	Changes in the RPS system	Level 3

Note:

Limitation 1: *Upper tolerance of 5% of MAUW will be allowed for cumulative modification (including previous modification(s), if any);*

Limitation 2: *Class of the UAS model shall not change due to the modification(s).*