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Circular

Director-General
Aviation Safety and Security Department
Japan Civil Aviation Bureau
Ministry Land, Infrastructure, Transport and Tourism

Subject: The Inspection Manual of Safety and Uniformity Standards for Unmanned Aircraft Systems (UAS) Type Certificate, etc.

Note: It is noted that if there is a translation difference between English and Japanese, then Japanese should be the official language to refer to.

(translated on June 28, 2024)

Purpose

The purpose of this Circular is to establish the Inspection Manual of Safety and Uniformity Standards for Unmanned Aircraft Systems (UAS) Type Certificate, etc., under the provisions of Article 132-13 and Article 132-16 of the Civil Aeronautics Act (Act No. 231 of July 15, 1952; hereinafter referred to as the "Act"), and relevant persons are required to conduct inspections in accordance with this Circular in principle.

Part I General

1. Inspections to be conducted for the purpose of determining whether unmanned aircraft systems and equipment are compliant with the “Standards concerning Strength, Structure and Performance to Ensure Safety” under Article 236-15 of the Regulation for Enforcement of the Civil Aeronautics Act (Order of the Ministry of Transport No.56 of 1952) (hereinafter referred to as “Safety Standards”) and the “Standards for Specifying as those Necessary to Ensure Uniformity” under Article 236-24 of said Regulation (hereinafter referred to as “Uniformity Standards”) shall be as prescribed by this Inspection Manual.

2. Each inspection on materials and parts shall be compliant with JIS, RTCA, EUROCAE, ASTM, SAE, MIL, or any other standard deemed appropriate by the chief aeronautical engineer - aircraft design or an inspector designated by the representative of a Registered Unmanned Aircraft System Inspection Organization (limited to class II UAS Certification or class II UAS Type Certification in case of an inspector from the Registered Unmanned Aircraft Inspection Organization).

3. Safety Standards to be complied with by the applicant for the type of unmanned aircraft system pertaining to the application shall be specified in Part II and Uniformity Standards to be complied with shall be specified in Part III.

4. Any inspection pertaining to an unmanned aircraft system whose type is the same as that of an unmanned aircraft system that obtained UAS Type Certification before the revision of this Inspection Manual or an unmanned aircraft system that has obtained UAS Certification shall be compliant with this Inspection Manual or method that was used when an inspection for granting said UAS Type Certification or UAS Certification was conducted, except when another method is prescribed by this Inspection Manual.

5. Any inspection pertaining to an unmanned aircraft system whose type is certified by the chief aeronautical engineer - aircraft design or an inspector designated by the representative of Registered Unmanned Aircraft Inspection Organization (limited to class II UAS Certification or class II UAS Type Certification in case of an inspector from the Registered Unmanned Aircraft Inspection Organization) as belonging to the same series as the type of an unmanned aircraft system that obtained UAS Type Certification before the revision of this Inspection Manual shall be compliant with this Inspection Manual or method that is used when an inspection for granting said UAS Type Certification was conducted, except when another method is prescribed by this Inspection Manual.

6. In cases where any part of this Inspection Manual is not applicable or where it is deemed more appropriate to use a method not stipulated in this Inspection Manual, the "chief aeronautical engineer - aircraft design" may omit or modify the relevant part of this Inspection Manual.

7. Part II “Safety Standards” of this Inspection Manual includes provisions of Special Class Airworthiness Criteria (issued in 2022), standards applicable to each type of unmanned aircraft systems, which are established in accordance with the provisions of 14 CFR §21.17(b) relating to unmanned aircraft systems that need to obtain UAS Type Certification in the U.S.

Part II Safety Standards

Chapter 1 General

1-1 This Inspection Manual sets forth safety standards for an unmanned aircraft system seeking class I UAS Certification or an unmanned aircraft system of a type seeking class I UAS Type Certification which is supposed to fly in air space other than the air space above an area with a population density of 15,000 or more per square kilometer (hereinafter referred to as "Specific Air Space"), and for an unmanned aircraft system seeking class II UAS Certification or an unmanned aircraft system of a type seeking class II UAS Type Certification. Furthermore, the provisions of Part II of the Airworthiness Inspection Manual (Established on October 20, 1966; Ku-Ken No.381) shall apply mutatis mutandis to an unmanned aircraft system seeking class I UAS Certification or an unmanned aircraft system of a type seeking class I UAS Type Certification which is supposed to fly in air space including Specific Air Space.
With regard to radio equipment of radio stations subject to the Radio Act (Act No.131 of 1950), the Safety Standards include technical standards stipulated in said Act.

1-2 The applicant shall prove that the unmanned aircraft system to the application, for which class I UAS Certification or class I UAS Type certification conforms to the relevant provisions of Chapter 2 of this Inspection Manual or Part Ⅱ of the Airworthiness Inspection Manual, and for which class Ⅱ UAS Certification or class Ⅱ UAS Type certification conforms to the relevant provisions of Chapter 3 of this Inspection Manual.

Chapter 2 Safety Standards

(Relating to an unmanned aircraft seeking class I UAS Certification or an unmanned aircraft of a type seeking class I UAS Type certification which flies in air space other than Specific Air Space)

- 001 Concept of Operations (CONOPS)

The applicant must define and submit to the Japan Civil Aviation Bureau a concept of operations (CONOPS) proposal describing the unmanned aircraft system (UAS) operation in the national airspace system for which UAS type certification is requested. The CONOPS proposal must describe, at a minimum, a description of the following information in sufficient detail to determine the parameters and extent of testing and operational limitations:

(a) The intended type of operations;

(b) specifications of the Unmanned Aircraft(UA);

(c) Meteorological conditions;

(d) Operators, remote pilots, and related personnel responsibilities;

(e) Specification of associated elements ("AE") required to comply with safety standards（including control station ("CS"), auxiliary equipment and other necessary systems）

(f) Command, control, and communication functions to be used for safe UA operations;

(g) Operational parameters (such as population density, geographic operating boundaries, airspace classes, launch and recovery area, congestion of proposed operating area, communications with air traffic control, line of sight (maximum communication distance in the event of visual line of sight operations, type of radio system to be used and maximum communication distance in the event of beyond visual line of sight operations), and aircraft separation); and

(h) Specification of collision avoidance equipment, if certification is requested.

- 005 Definitions

(a) Loss of Control: Loss of control means an unintended departure of an aircraft from controlled flight. It includes control reversal or an undue loss of longitudinal, lateral, and directional stability and control. It also includes an upset or entry into an unscheduled or uncommanded attitude with high potential for uncontrolled impact with terrain. A loss of control means a spin, loss of control authority, loss of aerodynamic stability, divergent flight characteristics, or similar occurrence, which could generally lead to crash.

(b) Loss of Flight: Loss of flight means a UA's inability to complete its flight as planned, up to and through its originally planned landing. It includes scenarios where the UA experiences a controlled flight into terrain, obstacles, or any other collision, or a loss of altitude that is severe or non-reversible. Loss of flight also includes deploying a parachute or ballistic recovery system that leads to an unplanned landing outside the operator's designated recovery zone.

- 100 UA Signal Monitoring and Transmission

The UA must be designed to monitor and transmit to the AE all information required for continued safe flight and operation. This information includes, at a minimum, the following:

(a) Status of all critical parameters for all energy storage systems;

(b) Status of all critical parameters for all propulsion systems;

(c) Flight and navigation information as appropriate, such as speed, heading, altitude, and location; and

(d) Communication and navigation signal strength and quality, including contingency information or status.

- 105 UAS AE Required for Safe UA Operations

(a) The applicant must identify and submit to the Japan Civil Aviation Bureau all AE and interface conditions of the UAS that affect the safety of the UA or are otherwise necessary for the UA to meet these Safety Standards. As part of this requirement—

(1) The applicant may identify either specific AE or minimum specifications for the AE.

(i) If minimum specifications are identified, they must include the critical requirements of the AE, including performance, compatibility, function, reliability, interface, pilot alerting, and environmental requirements.

(ii) Critical requirements are those that if not met would impact the ability to operate the UA safely and efficiently.

(2) The applicant may use an interface control drawing, a requirements document, or other reference, titled so that it is clearly designated as AE interfaces to the UA.

(b) The applicant must show that the AE or minimum specifications identified in paragraph (a) of this Section meet the following:

(1) The AE provide the functionality, performance, reliability, and information to assure UA safety in conjunction with the rest of the design;

(2) The AE are compatible with the UA capabilities and interfaces;

(3) The AE must monitor and transmit to the pilot all information required for safe flight and operation, including but not limited to those identified in Section 100; and

(4) The minimum specifications, if identified, are correct, complete, consistent, and verifiable to assure UA safety.

(c) The minimum specifications for the AE, established by the applicant as operational limitations and approved by the Japan Civil Aviation Bureau, must be included in the UAS Flight Manual.

(d) The applicant must develop maintenance instructions necessary to address implications from the AE on the Safety of the UA. Those instructions must be described in the instructions for check and maintenance of the UAS (hereinafter referred to as "ICA" in this chapter) required by Section 205.

- 110 Software

To minimize the existence of software errors, the applicant must:

(a) Verify by test all software that may impact the safe operation of the UA;

(b) Utilize a configuration management system that tracks, controls, and preserves changes made to software throughout the entire life cycle; and

(c) Implement a problem reporting ("PR") system that captures and records defects and modifications to the software.

- 115 Cybersecurity

(a) UA equipment, systems, and networks, addressed separately and in relation to other systems, must be protected from intentional unauthorized electronic interactions that may result in an adverse effect on the security or safety of the UA. Protection must be ensured by showing that the security risks have been identified, assessed, and mitigated as necessary.

(b) When required by paragraph (a) of this Section, procedures and instructions to ensure security protections are maintained must be described in the ICA.

- 120 Contingency Planning

(a) The UA must be designed so that, in the event of a loss of the command and control link (hereinafter referred to as "C2 link" in this chapter), the UA will automatically and immediately execute a safe predetermined flight, loiter, landing, or termination.

(b) The applicant must establish the predetermined action in the event of a loss of the C2 link and describe it in the UAS Flight Manual.

(c) The applicant must establish in the UAS Flight Manual the minimum performance requirements for the C2 link, which will not be able to guarantee remote control due to performance degradation. Takeoff when the C2 link is degraded below the minimum link performance requirements must be prevented by design or prohibited by operational limitations in the UAS Flight Manual.

- 125 Lightning

(a) Except as provided in paragraph (b) of this Section, the UA must have design characteristics that will protect the UA from loss of flight or loss of control due to lightning.

(b) If the UA has not been shown to protect against lightning, the UAS Flight Manual must include operational limitations to prohibit flight into weather conditions conducive to lightning activity.

- 130 Adverse Weather Conditions

(a) For purposes of this Section, “adverse weather conditions’’ means rain, snow, and icing.

(b) Except as provided in paragraph (c) of this Section, the UA must have design characteristics that will allow the UA to operate within the adverse weather conditions specified in the CONOPS without loss of flight or loss of control.

(c) For adverse weather conditions for which the UA is not approved to operate, the applicant must develop operational limitations to prohibit flight into known adverse weather conditions and either:

(1) Develop operational limitations to prevent inadvertent flight into adverse weather conditions; or

(2) Provide a means to detect any adverse weather conditions for which the UA is not certificated to operate and show the UA's ability to avoid or exit those conditions.

- 135 Flight Essential Parts

(a) A flight essential part is a part, the failure of which could result in a loss of flight or unrecoverable loss of UA control.

(b) If the type design includes flight essential parts, the applicant must establish a flight essential parts list, the applicant must develop and define mandatory maintenance instructions or life limits, or a combination of both, to prevent failures of flight essential parts. Each of these mandatory actions must be included in the Chapter of the instructions for mandatory check and maintenance in the ICA.

- 140 Other Necessary Design and Configurations

- 140-1 Structures

(a) Materials and procedures to be used for the UA must be appropriately defined.

(b) The UA must be of a structure free of sharp protrusions, except as structurally necessary.

(c) UA with the maximum takeoff weight of 25 kg or more must be so structured that, in the case of failure of the engine, motor, propeller, or rotor, the possibility of scattering of damaged parts of such components is kept as low as possible.

(d) UA supposed to fly over a third party or areas with a dense population of people or houses, less than 30 meters above a person or object on the ground or water, or over an event venue where many people gather, must have a function to reduce the risk of harm to third parties or objects such as the following examples.

(1) Propeller guard

(2) Material for mitigating impact of collisions

(3) Cover for mitigating impact of collisions

(4) Parachute for mitigating impact of collisions

- 140-2 Lights, marks, etc.

(a) The UA must have lights, markings, etc. which make the position and orientation of the aircraft accurately visible.

(b) UA supposed to fly in the vicinity of an airport or in air space 150 meters or more above the ground, or to perform beyond visual line of sight operations must be equipped with lights so as to be recognized by another aircraft as easily as possible, or must be painted in a manner that makes the aircraft easy to recognize during the flights.

(c) UA supposed to fly at night must be equipped with lights so that its attitude and orientation can be accurately seen.

- 140-3 Autopilot system, cameras, etc.

(a) UA supposed to perform beyond visual line of sight operations must be equipped with an autopilot system so that conditions outside the airframe can be monitored through cameras, etc. installed on the airframe.

(b) UA supposed to perform beyond visual line of sight operations must be so equipped that its status, as well as conditions of other aircraft in the vicinity of its flight path, can be continuously monitored on the ground by cameras, etc. installed on the airframe. If this requirement is not met, the UAS Flight Manual must provide methods for continuously monitoring conditions of the unmanned aircraft, as well as those of other aircraft in the vicinity of the flight path, as operational limitations.

- 140-4 Transportation of dangerous objects

UA supposed to transport dangerous objects must have equipment suitable for that purpose.

- 140-5 Recording flight characteristics

UA with maximum takeoff weight of 25 kg or more must have functions that enable the UAS Type Certificate holder to record flight characteristics (such as flight path (aircraft position, altitude, speed and time), airframe attitude, power supply voltage, remaining battery level, and global navigation satellite system (hereinafter referred to as "GNSS" in this chapter) positioning) to contribute to improvement of performance of the type and cause analysis of defects and to utilize the data to determine causes of accidents.

- 140-6 Reciprocating Engine and Fuel Carriage

The applicant must show that the engine meets the following requirements.

(a) Lines containing or conveying flammable fluids subject to high temperatures must be fire resistant.

(b) Components must be shielded or located to safeguard against the ignition of leaking flammable fluid.

(c) Compartments, including fuel tanks, where flammable fluid or vapor may exist must have adequate and effective ventilation and drainage.

(d) The powerplant installation must be designed to prevent hazardous amounts of contamination of the fuel supplied to the engine.

(e) The fuel system must protect the UA from damage that could result in spillage of enough fuel to constitute a fire hazard as a result of a reasonably foreseeable UA accident, based on the operating environment documented in the CONOPS.

- 200 UAS Flight Manual

The applicant must provide an UAS Flight Manual with each UA.

(a) The UAS Flight Manual must contain the following information:

(1) UA operational limitations;

(2) UA operating procedures;

(3) Performance information;
(4) Loading information; and
(5) Other information that is necessary for safe operation because of design, operating, or handling characteristics.

(b) Those portions of the UAS Flight Manual containing the information specified in paragraph (a)(1) of this Section must be approved by the Japan Civil Aviation Bureau.

- 205 ICA

The applicant must create an ICA acceptable to the Japan Civil Aviation Bureau. For the purpose of this Chapter, ICA shall refer to written procedures with which the user can appropriately inspect and maintain the UA, its equipment, components, parachutes and AE. It is recommendable to refer to Appendix A (Instructions for Maintaining Airworthiness), Part II of the Airworthiness Inspection Manual when creating the ICA.

The Chapter of the instructions for mandatory check and maintenance in the ICA must be approved by the Japan Civil Aviation Bureau.

- 300 Durability and Reliability

The UA must be designed to be durable and reliable when operated under the limitations prescribed for its operating environment, as documented in its CONOPS and included as operational limitations in the UAS Flight Manual. The durability and reliability must be demonstrated by flight test in accordance with the requirements of this Section and completed with no failures that result in a loss of flight, loss of control, loss of containment, or emergency landing outside the operator's recovery area.

(a) Once a UA has begun testing to show compliance with this Section, all flights for that UA must be described in the flight test report.

(b) Tests must include an evaluation of the entire flight envelope across all phases of operation and must address, at a minimum, the following:
(1) Flight distances;
(2) Flight durations;
(3) Route complexity;
(4) Weight;
(5) Center of gravity;
(6) Density altitude;
(7) Outside air temperature;
(8) Airspeed;
(9) Wind;
(10) Weather;
(11) Operation at night, if requested;
(12) Energy storage system capacity; and
(13) Aircraft to pilot ratio (1:1, 1:multiple, etc.).

(c) Tests must include the most adverse combinations of the conditions and configurations in paragraph (b) of this Section.

(d) Tests must show a distribution of the different flight profiles and routes representative of the type of operations identified in the CONOPS.

(e) Tests must be conducted in conditions consistent with the expected environmental conditions identified in the CONOPS, including electromagnetic interference (EMI) and high intensity radiated fields (HIRF).

(f) Tests must not require exceptional piloting skill or alertness.

(g) Any UAS used for testing must be subject to the same worst-case ground handling, shipping, and transportation loads as those allowed in service.

(h) Any UA used for testing must use AE that meet, but do not exceed, the minimum specifications identified under Section 105. If multiple AE are identified, the applicant must demonstrate each configuration.

(i) Any UAS used for testing must be maintained and operated in accordance with the ICA and UAS Flight Manual. No maintenance beyond the intervals established in the ICA will be allowed to show compliance with this Section.

(j) If cargo operations or external-load operations are requested, tests must show, throughout the flight envelope and with the cargo or external-load at the most critical combinations of weight and center of gravity, that—

(1) The UA is safely controllable and maneuverable; and

(2) The cargo or external load are retainable and transportable.

- 305 Probable Failures

The UA must be designed such that a probable failure will not result in a loss of containment or control of the UA. This must be demonstrated by test.

(a) Probable failures related to the following equipment, depending on the design of the UA, at a minimum, must be addressed:

(1) Propulsion systems;

(2) C2 link;

(3) Global Navigation Satellite System ("GNSS");

(4) Flight control components with a single point of failure;

(5) Control station; and

(6) Any other AE identified by the applicant.

(b) Any UA used for testing must be operated in accordance with the UAS Flight Manual.

(c) Each test must occur at the critical phase and mode of flight, and at the highest aircraft-to-pilot ratio.

- 310 Capabilities and Functions

(a) All of the following required UAS capabilities and functions must be demonstrated by test:

(1) Capability to regain command and control of the UA after the C2 link has been lost.

(2) Capability of the electrical system to power all UA systems and payloads.

(3) Ability for the pilot to safely discontinue the flight.

(4) Ability for the pilot to dynamically re-route the UA.

(5) Ability to safely abort a takeoff.

(6) Ability to safely abort a landing and initiate a go-around.

(b) The following UAS capabilities and functions, if requested for approval, must be demonstrated by test:

(1) Continued flight after degradation of the propulsion system.

(2) Geo-fencing that contains the UA within a designated area, in all operating conditions.

(3) Positive transfer of the UA between control stations that ensures only one control station can control the UA at a time.

(4) Capability to release an external cargo load to prevent loss of control of the UA.

(5) Capability to detect and avoid other aircraft and obstacles.

(c) The UA must be designed to safeguard against inadvertent discontinuation of the flight and inadvertent release of cargo or external load.

- 315 Fatigue

The structure of the UA must be shown to withstand the repeated loads expected during its service life without failure. The applicant must establish a lift limit for the airframe, demonstrate by test, and described in the ICA.

- 320 Verification of Limits

The performance, maneuverability, stability, and control of the UA within the flight envelope described in the UAS Flight Manual must be demonstrated at a minimum of 5% over maximum gross weight with no loss of control or loss of flight.

Chapter 3 Safety Standards

(Relating to an unmanned aircraft seeking class Ⅱ UAS Certification or an unmanned aircraft of a type seeking class Ⅱ UAS Type certification)

- 001 Concept of Operations (CONOPS)

The applicant must define and submit to the Japan Civil Aviation Bureau or a Registered Unmanned Aircraft Inspection Organization (hereinafter referred to as “Inspection Body” in this chapter) a concept of operations (CONOPS) proposal describing the unmanned aircraft system (UAS) operation in the national airspace system for which UAS type certification is requested. The CONOPS proposal must describe, at a minimum, a description of the following information in sufficient detail to determine the parameters and extent of testing and operational limitations:

(a) The intended type of operations;

(b) specifications of the Unmanned Aircraft(UA);

(c) Meteorological conditions;

(d) Operators, remote pilots, and related personnel responsibilities;

(e) Specification of associated elements ("AE") required to comply with safety standards（including control station ("CS"), auxiliary equipment and other necessary systems）

(f) Command, control, and communication functions to be used for safe UA operations;

(g) Operational parameters (such as population density, geographic operating boundaries, airspace classes, launch and recovery area, congestion of proposed operating area, communications with air traffic control, line of sight (maximum communication distance in the event of visual line of sight operations, type of radio system to be used and maximum communication distance in the event of beyond visual line of sight operations), and aircraft separation); and

(h) Specification of collision avoidance equipment, if certification is requested.

- 005 Definitions

(a) Loss of Control: Loss of control means an unintended departure of an aircraft from controlled flight. It includes control reversal or an undue loss of longitudinal, lateral, and directional stability and control. It also includes an upset or entry into an unscheduled or uncommanded attitude with high potential for uncontrolled impact with terrain. A loss of control means a spin, loss of control authority, loss of aerodynamic stability, divergent flight characteristics, or similar occurrence, which could generally lead to crash.

(b) Loss of Flight: Loss of flight means a UA’s inability to complete its flight as planned, up to and through its originally planned landing. It includes scenarios where the UA experiences a controlled flight into terrain, obstacles, or any other collision, or a loss of altitude that is severe or non-reversible. Loss of flight also includes deploying a parachute or ballistic recovery system that leads to an unplanned landing outside the operator’s designated recovery zone.

- 100 UA Signal Monitoring and Transmission

The UA must be designed to monitor and transmit to the AE all information required for continued safe flight and operation. This information includes, at a minimum, the following:

(a) Status of all critical parameters for all energy storage systems;

(b) UA with the maximum takeoff weight of 4 kg or more, status of all critical parameters for all propulsion systems;

(c) In the case of the UA with a maximum takeoff weight of less than 4 kg and carrying out a beyond visual line of sight operation, and the UA with a maximum takeoff weight of 4 kg or more,

(1) Flight and navigation information as appropriate, such as speed, heading, altitude, and location; and

(2) Communication and navigation signal strength and quality, including contingency information or status.

- 105 UAS AE Required for Safe UA Operations

(a) The applicant must identify and submit to the Inspection Body the performance, functionality, communication compatibility with the aircraft, pilot alerts, reliability and environmental requirements for all AE of the UA that affect the safety of the UA or meet safety standards.

(b) The minimum specifications for the AE, established by the applicant as operational limitations and approved by the Japan Civil Aviation Bureau, must be included in the UAS Flight Manual.

(c) The applicant must develop maintenance instructions necessary to address implications from the AE on the Safety of the UA. Those instructions must be described in the instructions for check and maintenance of the UAS (hereinafter referred to as "ICA" in this chapter) required by Section 205.

- 110 Software

The applicant must submit to the Inspection Body the results of the applicant's own confirmation that the software meets the following requirements.

(a) Ensure that all software that affects the safe operation of the UA has the necessary functions; and

(b) Change management to manage software changes.

- 115 Cybersecurity

(a) The applicant must submit to the Inspection Body the results of the applicant's own confirmation that the equipment, systems and networks of the UA aerial vehicle linked to another system are protected from intentional and unauthorized electronic interference that adversely affects the safety of the UA.

(b) When required by paragraph (a) of this Section, the applicant must describe procedures and instructions to ensure security protections in the ICA.

- 120 Contingency Planning

(a) The UA with a maximum takeoff weight of less than 4 kg and carring out a beyond visual line of sight operations flights in the air space specified in any item of paragraph (1), Article 132-85 of the Act or flights that do not use any of the methods specified in items of paragraph (2), Article 132-86 of the Act and the UA with a maximum takeoff weight of 4 kg or more, must be designed such that, in the event of

a loss of the command and control link (hereinafter referred to as "C2 link" in this chapter), the UA will execute a safe predetermined flight, loiter, landing, or termination.

(b) For the UA with a maximum takeoff weight of 4 kg or more, the applicant must establish the predetermined action in the event of a loss of the C2 link and describe it in the UAS Flight Manual.

(c) For the UA with a maximum takeoff weight of 4 kg or more, the applicant must describe in the UAS Flight Manual the minimum performance requirements for the C2 link, which cannot be guaranteed remote active control due to performance degradation. If the C2 link fails to meet the minimum performance requirements due to performance degradation, takeoff must be prevented by design or prohibited by operational limitations specified in the UAS Flight Manual.

- 125 Lightning

(a) Except as provided in paragraph (b) of this Section, the UA must have design characteristics that will protect the UA from loss of flight or loss of control due to lightning.

(b) If the UA has not been shown to protect against lightning, the UAS Flight Manual must include operational limitations to prohibit flight into weather conditions conducive to lightning activity.

- 130 Adverse Weather Conditions

(a) For purposes of this Section, “adverse weather conditions’’ means rain, snow, and icing.

(b) Except as provided in paragraph (c) of this Section, the UA must have design characteristics that will allow the UA to operate within the adverse weather conditions specified in the CONOPS without loss of flight or loss of control.

(c) For adverse weather conditions for which the UA is not approved to operate, the applicant must develop operational limitations to prohibit flight into known adverse weather conditions and either:

(1) Develop operational limitations to prevent inadvertent flight into adverse weather conditions; or

(2) Provide a means to detect any adverse weather conditions for which the UA is not certificated to operate and show the UA’s ability to avoid or exit those conditions.

- 135 Flight Essential Parts

The applicant shall set up maintenance procedures and/or life limits required to prevent malfunction of propellers, motors (including engines, if equipped with engines), ESC (Electric Speed Controller) batteries, flight controllers, and global navigation satellite system (hereinafter referred to as "GNSS" in this chapter) positioning) (and parts deemed particularly important by the applicant).

Each of these mandatory actions must be included in the Chapter of the instructions for mandatory check and maintenance in the ICA.

- 140 Other Necessary Design and Configurations

The applicant must submit to the Inspection Body the results of the applicant's own confirmation that the UA meets the following requirements.

- 140-1 Structures

(a) Materials and procedures to be used for the UA must be appropriately defined.

(b) The UA must be of a structure free of sharp protrusions, except as structurally necessary.

(c) UA with the maximum takeoff weight of 25 kg or more must be so structured that, in the case of failure of the engine, motor, propeller, or rotor, the possibility of scattering of damaged parts of such components is kept as low as possible.

(d) UA supposed to fly over areas with a dense population of people or houses, less than 30 meters above a person or object on the ground or water, or over an event venue where many people gather, must have a function to reduce the risk of harm to third parties or objects such as the following examples.

(1) Propeller guard

(2) Material for mitigating impact of collisions

(3) Cover for mitigating impact of collisions

(4) Parachute for mitigating impact of collisions

- 140-2 Lights, marks, etc.

(a) The UA must have lights, markings, etc. which make the position and orientation of the aircraft accurately visible.

(b) UA supposed to fly in the vicinity of an airport or in air space 150 meters or more above the ground, or to perform beyond visual line of sight operations (without an assistant) must be equipped with lights so as to be recognized by another aircraft as easily as possible, or must be painted in a manner that makes the aircraft easy to recognize during the flights.

(c) UA supposed to fly at night must be equipped with lights so that its attitude and orientation can be accurately seen.

- 140-3 Autopilot system, cameras, etc.

(a) UA supposed to perform beyond visual line of sight operations must be equipped with an autopilot system so that conditions outside the airframe can be monitored through cameras, etc. installed on the airframe.

(b) UA supposed to perform a beyond visual line of sight operations (without an assistant) must be so equipped that its status, as well as conditions of other aircraft in the vicinity of its flight path, can be continuously monitored on the ground by cameras, etc. installed on the airframe. If this requirement is not met, the UAS Flight Manual must provide methods for continuously monitoring conditions of the unmanned aircraft, as well as those of other aircraft in the vicinity of the flight path, as operational limitations.

- 140-4 Transportation of dangerous objects

UA supposed to transport dangerous objects must have equipment suitable for that purpose.

- 140-5 Recording flight characteristics

UA with maximum takeoff weight of 25 kg or more must have functions that enable the holder of UAS Type Certification to record flight characteristics (such as flight path (aircraft position, altitude, speed and time), airframe attitude, power supply voltage, remaining battery level, and GNSS positioning) to contribute to improvement of performance of the type and cause analysis of defects and to utilize the data to determine causes of accidents.

-140-6 Reciprocating Engine and Fuel Carriage

The applicant must show that the engine meets the following requirements.

(a) Lines containing or conveying flammable fluids subject to high temperatures must be fire resistant.

(b) Components must be shielded or located to safeguard against the ignition of leaking flammable fluid.

(c) Compartments, including fuel tanks, where flammable fluid or vapor may exist must have adequate and effective ventilation and drainage.

(d) The powerplant installation must be designed to prevent hazardous amounts of contamination of the fuel supplied to the engine.

(e) The fuel system must protect the UA from damage that could result in spillage of enough fuel to constitute a fire hazard as a result of a reasonably foreseeable UA accident, based on the operating environment documented in the CONOPS.

- 200 UAS Flight Manual

The applicant must provide a Flight Manual with each UA.

(a) The UAS Flight Manual must contain the following information:

(1) UA operational limitations;

(2) UA operating procedures;

(3) Performance information;

(4) Loading information; and

(5) Other information that is necessary for safe operation because of design, operating, or handling characteristics.

(b) Those portions of the UAS Flight Manual containing the information specified in paragraph (a)(1) of this Section must be approved by the Japan Civil Aviation Bureau.

- 205 ICA

The applicant must create an ICA acceptable to the Inspection Body. For the purpose of this Chapter, ICA shall refer to written procedures with which the user can appropriately inspect and maintain the UA, its equipment, components, parachutes and AE.

The Chapter of the instructions for mandatory check and maintenance in the ICA must be approved by the Japan Civil Aviation Bureau.

- 302 Operational Demonstration

The UA must be designed to operate under the limitations of the operating environment described in the CONOPS and included in the UAS Flight Manual as the UA operational limitations. Its operational capability must be demonstrated by tests in accordance with the requirements in this section.

(a) The following should be considered for tests so that the tests can cover all flight envelopes across all phases of operation as much as possible.

(1) Flight distances;

(2) Flight durations;

(3) Route complexity;

(4) Weight;

(5) Center of gravity;

(6) Density altitude;

(7) Outside air temperature;

(8) Airspeed;

(9) Wind;

(10) Weather;

(11) Operation at night, if requested;

(12) Energy storage system capacity; and

(13) Aircraft to pilot ratio (1:1, 1:multiple, etc.).

(b) A representative combination of the conditions and configurations in paragraph (a) of this Section must be selected for the test.

(c) The test must be conducted under a typical operating environment described in CONOPS.

(d) Tests must not require exceptional piloting skill or alertness.

(e) Any UA used for testing must use AE that meet, but do not exceed, the minimum specifications identified under Section 105.

(f) If cargo operations or external-load operations are requested, tests must show, throughout the flight envelope and with the cargo or external-load at the most critical combinations of weight and center of gravity, that—

(1) The UA is safely controllable and maneuverable; and

(2) The cargo or external load are retainable and transportable.

- 305 Probable Failures

The UA with a maximum takeoff weight of less than 25 kg and carrying out a beyond visual line of sight operations flights in the air space specified in any item of paragraph (1), Article 132-85 of the Act or flights that do not use any of the methods specified in items of paragraph (2), Article 132-86 of the Act and the UA with a maximum takeoff weight of 25 kg or more, must be designed such that a probable failure will not result in a loss of containment of the UA. This must be demonstrated by test.

(a) For probable failures, at least those related to the following equipment must be considered. It is not necessary to consider (1), (4) and (5) for the UA with a maximum takeoff weight of less than 25 kg and carrying out a beyond visual line of sight operations.
   (1) Propulsion systems;
   (2) C2 link;
   (3) GNSS;
   (4) Flight control components with a single point of failure;
   (5) Control station; and
   (6) Any other AE identified by the applicant.

(b) Any UA used for testing must be operated in accordance with the UAS Flight Manual.

(c) Each test must occur at the critical phase and mode of flight, and at the highest aircraft-to-pilot ratio.

- 310 Capabilities and Functions

(a) All of the following required UAS capabilities and functions must be demonstrated by test:
   (1) Capability to regain command and control of the UA after the C2 link has been lost (limited to the UA with a maximum takeoff weight of less than 4 kg and carrying out a beyond visual line of sight operations and the UA with a maximum takeoff weight of 4 kg or more).
   (2) Capability of the electrical system to power all UA systems and payloads (limited to the UA with a maximum takeoff weight of 4 kg or more).
   (3) Ability for the pilot to safely discontinue the flight.
   (4) Ability for the pilot to dynamically re-route the UA.
   (5) Ability to safely abort a takeoff.
   (6) Ability to safely abort a landing and initiate a go-around.

(b) The following UAS capabilities and functions, if requested for approval, must be demonstrated by test:
   (1) Continued flight after degradation of the propulsion system.
   (2) Geo-fencing that contains the UA within a designated area, in all operating conditions.
   (3) Positive transfer of the UA between control stations that ensures only one control station can control the UA at a time.
   (4) Capability to release an external cargo load to prevent loss of control of the UA.
   (5) Capability to detect and avoid other aircraft and obstacles.

(c) The UA with a maximum takeoff weight of less than 4 kg and carrying out a airdrop operation, and the UA with a maximum takeoff weight of 4 kg or more must be designed to safeguard against inadvertent discontinuation of the flight and inadvertent release of cargo or external load.

- 317 Fatigue

For the UA with a maximum takeoff weight of 25 kg or more, the airframe must be able to withstand repeated loads for the life of the UA. The applicant must specify a life limit of the airframe in the ICA.

- 322 Flight Envelope Safety Margin

The UA with a maximum takeoff weight of 25 kg or more must be designed so that loss of flight or loss of control does not occur when the aircraft exceeding the maximum gross weight by 5% considering the performance, maneuverability, stability, and control of the UA within the flight envelope described in the UAS Flight Manual.

Part III Uniformity Standards

Chapter 1 General

1-1 These Guidelines shall establish uniformity standards for class I UAS Type Certification and class II UAS Type Certification.

1-2 The applicant shall demonstrate that the manufacture and inspection (including inspections under the provisions of Article 132-18, paragraph 2 of the Act)(hereinafter collectively referred to as “Manufacture and Other Activities”) of an unmanned aircraft system of a type pertaining to the application conform to the relevant provisions in Chapter 2, and describe matters concerning the implementation of said Manufacture and Other Activities in a document.

1-3 Means of compliance with the requirements set forth in the following Chapter may include, but not be limited to, a reference to the acquisition status of the known standards (equivalent to JIS Q 9100 for class I UAS Type Certification and to JIS Q 9001 for class Ⅱ UAS Type Certification). If an applicant for class Ⅱ UAS Type Certification has obtained a publicly known standard equivalent to JIS Q 9001, the applicant may demonstrate compliance with the requirements by applicant's own confirmation of meeting the requirements in the following chapter and submitting the results.

Chapter 2 Uniformity Standards

1 Facilities

1-1 Equipment

The applicant must have equipment necessary to embody the design during Manufacture and Other Activities (including measuring instruments, test equipment and tools to be used for activity). In particular, in cases where the designer of the unmanned aircraft system is different from the manufacturer and the designer specifies functions and requirements of equipment, the manufacturer must have equipment that satisfies the functions and requirements specified by the designer.

1-2 Workshop

A workshop with equipment necessary for Manufacture and Other Activities must have sufficient area for performing such Activities and must ensure smooth implementation of work, without excessively burdening workers with adjustment of appropriate illumination and ventilation. If the designer of the unmanned aircraft system subject to Manufacture and Other Activities, or any equipment, parts, parachutes, and AEs set forth in Part II (hereinafter referred to as "Equipment, etc."), which are components of the unmanned aircraft system, specifies the work environment as necessary for Manufacture and Other Activities, the designer's instructions must be respected.

1-3 Storage facility

The applicant must have a facility where materials, parts, and equipment, etc. necessary for Manufacture and Other Activities under Section 5-5 of this Chapter can be managed.

1-4 Borrowing facilities and equipment, etc.

If any equipment, workshop, or storage facility needs to be borrowed, conformance of the borrowed items to the standards set forth in Sections 1-1 to 1-3 of this Chapter must be obvious. In addition, if the lender specifies the methods for managing and using the facility, workshop, or storage facility, the lender's instructions must be respected.

The applicant must periodically confirm that the borrowed items are properly managed according to the standards set by the applicant as the UAS Type Certificate holder in accordance with Section 5-1 of this Chapter.

2 Organization

The applicant must appoint a chief administrator for Manufacture and Other Activities. The chief administrator must be either the Representative Director, who is ultimately responsible for operation of Manufacture and Other Activities, or a person designated by the Representative Director as a person given necessary authority including operation. Manufacture and Other Activities must be evenly distributed among all units or responsible people of all units throughout the applicant's entire organization, and authorities and responsibilities of all the units must be made clear.

3 Personnel

The personnel of each unit sharing Manufacture and Other Activities must be competent enough to carry out the tasks allocated to the unit. Each unit sharing Manufacture and Other Activities must be provided with a sufficient number of employees for performing tasks allocated to the unit.

4 Implementation method of work

Methods for preparing, operating, and managing the specific procedures for implementing Manufacture and Other Activities, including in-process inspections ("Intermediate Inspections"), functional inspections, final inspections, and inspections under the provisions of Article 132-18, paragraph 2 of the Act, must be established in the Manufacture Management Guidelines and complied with, so that the procedures are made clear and appropriate in work instructions, etc.

5 Quality control system

5-1 Maintenance and management of facilities

Methods for maintaining and managing facilities necessary for Manufacture and Other Activities under Section 1 of this Chapter must be clear and appropriate, must be established in an appropriate document, and must be complied with.

5-2 Education and training of personnel

With regard to education and training for employees of each unit sharing Manufacture and Other Activities under Section 3 of this Chapter, the types of training, trainees, training curriculum, and methods for implementation, evaluation, and recording must be clear and appropriate, must be established in an appropriate document, and must be complied with. The training must not only correspond to the types of Manufacture and Other Activities, but also be classified into new, regular, and temporary training according to the time for implementation and include acquisition of special qualifications.

5-3 Revision of implementation method of work

With regard to the revision (change) of the implementation method of work pursuant to Section 4 of this Chapter, details of the revision must be determined in accordance with the provisions of Section 4 of this Chapter, and the handling of the implementation method and procedures invalidated by the revision must be clear and appropriate, must be established in an appropriate document, and must be complied with.

5-4 Acquisition, management, and operation of technical materials

With regard to technical materials such as drawings, specifications, process requirements, work instructions, and standards, the latest version of such technical materials must be obtained and must be made easily available to employees who need the materials to perform Manufacture and Other Activities. Furthermore, the handling of technical materials that become obsolete due to changes must be clear and appropriate, must be established in an appropriate document, and must be complied with.

5-5 Management of materials, parts, and equipment, etc.

Methods for managing materials, parts, and equipment, etc. including storage methods and the storage period must be clear and appropriate, must be established in an appropriate document, and must be complied with. For management, the following provisions must be established.

(1) If the designer or manufacturer of materials, parts, and equipment, etc. specifies the storage method, their instructions must be respected.

(2) To prevent the mixing of defective products, a system for ensuring that defective materials, etc. are not used for Manufacture and Other Activities must be established.

5-6 Acceptance inspections of materials, parts, and equipment, etc., and intermediate and final inspections of the unmanned aircraft system and equipment, etc.

Methods for preparing, operating, and managing written inspection procedures must be established in an appropriate document and complied with, so that measures to be taken in connection with the following provisions are clear and appropriate.

(a) Standards for implementation of acceptance inspection of materials, parts, and equipment, etc. to be used for Manufacture and Other Activities must conform to those specified in the implementation method for work in which the materials, parts, and equipment, etc. are used under Section 4 of this Chapter. The method for implementing acceptance inspection must be sufficient to determine conformity with the standards mentioned above.

(b) Standards for implementation of intermediate and final inspections of the unmanned aircraft system and equipment, etc. constituting the aircraft and the inspection under the provisions of Article 132-18, paragraph 2 of the Act must conform to those specified in the implementation method for work in which the materials, parts, and equipment, etc. are used under Section 4 of this Chapter.

The method for implementing intermediate and final inspections and the inspection under the provisions of Article 132-18, paragraph 2 of the Act must be sufficient to determine conformity with the standards mentioned above, including the form of the inspection (whether it is conducted by the workers or by a third party independently from the workers). If the manufacturer's quality assurance process can ensure the conformity to the standards mentioned above, an intermediate inspection and a final inspection may be combined and performed at once. In addition, if conformity to the standards mentioned above is assured, the inspection under the provisions of Article 132-18, paragraph 2 of the Act may be additionally combined.

For each inspection conducted during the work, clear instructions (on the inspection timing, etc.) must be given in work instructions, etc., determination standards (such as limit values) must be specified, and procedures must be established so that inspection results are properly recorded. Thus, inspection results must be recorded in accordance with the procedures mentioned above. The method for storing records must be clear and appropriate. The provisions of Article 236-33 of the Regulation for

Enforcement of the Civil Aeronautics Act must apply to the retention period for the inspection record under the provisions of Article 132-18, paragraph 2 of the Act.

For inspections, the following provisions must be established.

(1) A person competent enough to conduct inspection in accordance with the standards and method set forth in this Section must conduct the inspection. A worker may conduct the inspection.

(2) Products that are found to be non-conforming as a result of an inspection must undergo necessary corrective action or be clearly separated as non-conforming products.

(3) While equipment, etc. is inspected by the UAS Type Certificate holder, the inspection must be handled as follows depending on the attributes of the equipment, etc. that is handled in the process of Manufacture and Other Activities.

(i) Equipment, etc. that is manufactured by the UAS Type Certificate holder must be appropriately inspected within the holder's inspection system.

(ii) Equipment, etc. that is manufactured by a manufacturer other than the UAS Type Certificate holder must be treated as being outsourced from the UAS Type Certificate holder, and the holder must conduct an appropriate acceptance inspection.

5-7 Process control

With regard to process control, methods for controlling the conformity of the work process to the implementation method of work under Section 4 of this Chapter must be clear and appropriate, must be established in an appropriate document, and must be complied with.

5-8 Management of implementation of work by the outsourcee in case of outsourcing

With regard to outsourcing management, the criteria for selecting the outsourcee, the scope and content of outsourcing, methods for acceptance inspection, and methods for auditing the outsourcee must be established in an appropriate document and must be complied with. The outsourcer must ensure that the outsourcee is competent enough for the outsourced work and conducts work in accordance with the order, through outsourcee management. Thus, standards and procedures for auditing the outsourcee must be established in order to ensure that the audits are appropriately conducted with appropriate frequency, so that the retention of the outsourcee's ability to perform work, which has been examined at the time of selection of the outsourcee, may be confirmed.

5-9 Management of work records

With regard to management of work records, the scope and content of the records, as well as the method and period for storing the records, must be clear and appropriate, must be established in an appropriate document, and must be complied with.

5-10 Audits conducted by a unit independent of units implementing work

With regard to the audit system conducted by a unit independent of the units that conduct work, the timing of audits, auditors, standards and methods for auditing, methods for recording audit results, and procedures for measures to correct nonconformities must be clear and appropriate, must be established in an appropriate document and must be complied with.

For audits, the following provisions must be established.

(1) Audits must be conducted under the responsibility of the chief administrator, who is ultimately responsible for compliance with laws and regulations. If the chief administrator does not conduct audits, persons designated by the chief administrator must conduct audits, and report audit results directly to the chief administrator.

(2) The persons conducting audits must belong to a unit independent of the subject of the audits and have knowledge of the Civil Aeronautics Act and other laws and regulations regarding the audited work.

(3) Appropriate measures to correct any nonconformity detected during the audits must be taken under the chief administrator’s responsibility.

Supplementary Provision (September 7, 2022)

1. The Circular shall come into effect as of December 5, 2022.

Supplementary Provision (November 11, 2022)

1. The Circular shall come into effect as of December 5, 2022.

Supplementary Provision (December 2, 2022)

1. The Circular shall come into effect as of December 5, 2022.

Supplementary Provision (March 27, 2024)

1. The Circular shall come into effect as of March 27, 2024.

If you have any questions or comments regarding this Circular, please contact the following.

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