International Civil Aviation Organization

**WORKING PAPER**

A41-WP/444
TE/164
30/8/22
**(Information paper)**
**English and Chinese only**[1]

# ASSEMBLY — 41ST SESSION

## TECHNICAL COMMISSION

**Agenda Item 31: Aviation Safety and Air Navigation Standardization**

## SPECIAL CONDITIONS FOR EHANG EH216-S UNMANNED AIRCRAFT SYSTEM

(Presented by China)


| EXECUTIVE SUMMARY | |
|---|---|
| This paper presents the background, main content and significance of the CAAC Standards Special Conditions for EHang EH216-S Unmanned Aircraft System. It is hoped that the development of this standard can provide reference for States in formulating relevant standards. | |
| *Strategic Objectives:* | This working paper relates to Safety and Air Navigation Capacity and Efficiently Strategic Objectives |
| *Financial implications:* | N/A |
| *References:* | N/A |


[1] English and Chinese versions provided by China.

## 1. INTRODUCTION

1.1 With the development of global urbanization, traffic congestion in cities has become increasingly serious. Urban Air Mobility (UAM) is a safe and efficient Uurban air traffic system, which has attracted the attention of many States over the world.

1.2 Passenger-carrying Unmanned Aircraft System (abbreviated as passenger-carrying UAS or PUAS) is a new type of aircraft in UAM system. As it is a new form and new category of aircraft, there's no applicable airworthiness regulation and lacks of basis for airworthiness certification and airworthiness justification, and therefore, it is hard to guarantee the safety of the public with this kind of aircraft.

1.3 With the rapid development of China's UAS industry, a number of enterprises are also actively developing passenger-carrying UAS, and relatively leading products have emerged, such as EH216-S passenger-carrying UAS independently developed by EHang Intelligent Equipment (Guangzhou) Co., Ltd.

1.4 Civil Aviation Administration of China (CAAC), in order to promote the development of Passenger-carrying UAS in China, has studied and put forward a new certification strategy based on operational risks. As per the requirements of Section 21.17 (II) of Certification Procedures for Civil Aviation Products and Parts, CAAC prepares and publishes special conditions for the special-category aircraft applying for type certificate.

1.5 On January 19, 2021, CAAC accepted the type certificate (TC) application for EH216-S submitted by EHang Intelligent Equipment (Guangzhou) Co., Ltd., and issued Special Conditions for EH216-S Unmanned Aircraft System on February 9, 2022, setting the airworthiness certification standard for this aircraft type.

## 2. DISCUSSION

2.1 The airworthiness certification of the passenger-carrying UAS is still in the exploratory stage. CAAC prepares and issues the Special Conditions for EHang EH216-S Unmanned Aircraft System based on the principles of operational risks and certification objectives, and also takes into consideration of relative industrial practices.

2.2 EH216-S passenger-carrying UAS is an unmanned aircraft system that can carry two passengers, including unmanned aircraft, ground control station and data links. The Special Conditions for EHang EH216-S Unmanned Aircraft System includes nine subparts and one appendix. They are Subpart A General, Subpart B Flight and Performance, Subpart C Structures, Subpart D Design and Construction, Subpart E Powerplant, Subpart F Systems and Equipment, Subpart G The Remote Crew Interface and Other Information, Subpart H Data Links, Subpart J Ground Control Station, and Appendix A Instructions for Continued Airworthiness. For details, please see the attached Special Conditions for EHang EH216-S Unmanned Aircraft System.

2.3 EH216-S passenger-carrying UAS is the first passenger-carrying UAS type certificate application accepted by CAAC.

## 3. CONCLUSION

3.1 Passenger-carrying UAS is a new form of aircraft in UAM system, and there's no existing airworthiness standards applicable to it in the world. CAAC compiled and issued Special Conditions for EHang EH216-S Unmanned Aircraft System and carried out practice and exploration on type certification.

3.2 CAAC has been exploring and issuing innovative aircraft airworthiness standards. Based on the exploration and practice of type certification on EHang EH216-S Passenger-carrying UAS, CAAC will develop more broadly applicable passenger-carrying UAS airworthiness standards to promote the development of UAS, and will share the progress in time. ICAO is invited to take note the progress in this area.

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**APPENDIX**

**SPECIAL CONDITIONS OF EHANG EH216-S UNMANNED AIRCRAFT SYSTEM**

# Content

## Subpart A General

### PEU.A000 Applicability and Definitions

(a) This *Special Conditions* is applicable for EHang EH216-S Unmanned Aircraft System including the features under PEU.A005;

(b) The following definitions are applicable to this *Special Conditions*:

(1) An Unmanned Aircraft System refers to the system consisting of the Unmanned Aircraft, related remote control platform (station), payload, control links, and others. It is abbreviated as PUAS in this *Special Conditions*;

(2) A civil Unmanned Aircraft refers to an aircraft which has no pilot onboard, self-contained flight control systems, and engages in flight missions other than those of the military, the police, and the customs, excluding aeromodelling, unmanned free balloons, and mooring balloons. It is abbreviated as UA in this *Special Conditions*;

(3) The remote crew refers to the remote operator of the UA and any other personnel directly participating in the operation of the UA.

(c) This *Special Conditions* has defined the UA's flight envelopes as follows:

(1) The "normal flight envelope" refers to the flight envelope related to the UA's daily operations and regulated conditions;

(2) The "operating flight envelope" refers to the flight envelope that triggers the UA's warning messages;

(3) The "limit flight envelope" refers to the flight envelope related to the UA's design limitation or protection limitation.

(d) Unless otherwise explained, the requirements in subparts B, C, D, E in this *Special Conditions* are only applicable to the UA.

### PEU.A005 Unmanned Aircraft

The Unmanned Aircraft in this *Special Conditions* including the following features:

(a) A fully electric propulsion system;

(b) Passenger-carrying, with a maximum of two seats;

(c) Maximum take-off weight less than 650 kilograms;

(d) Vertical take-off and landing;

(e) Flight control achieved by different rotation speeds of the lift/thrust components;

(f) Non-pressurized cabin.

**PEU.A010 Acceptable Means of Compliance**

(a) The applicant must comply with this *Special Conditions* using a means of compliance approved by Civil Aviation Administration of China (CAAC). And the means of compliance may include consensus standards and other standards accepted by CAAC;

(b) The applicant should submit the means of compliance in the formats and ways accepted by CAAC.

## Subpart B Flight and Performance

### B.1 Performance

#### PEU.B000 Mass and Center of Gravity

(a) The applicant must determine limits for mass and center of gravity that provide for the safe operation of the aircraft;

(b) The applicant's design must comply with each requirement of this Subpart at critical combinations of mass and center of gravity within the aircraft's range of loading conditions using acceptable tolerances acceptable by the CAAC;

(c) The condition of the aircraft at the time of determining its empty mass and center of gravity must be well defined and easily repeatable.

#### PEU.B005 Performance Data

(a) Unless otherwise prescribed, an aircraft must meet the performance requirements of this Subpart as follows:

(1) Still air and standard atmospheric conditions at sea level;

(2) If necessary, the ambient atmospheric conditions within the operating envelope.

(b) Unless otherwise prescribed, the applicant must develop the performance data required by this Subpart for the following conditions：

(1) Vertiport altitudes from sea level to the maximum certified take-off and landing altitude;

(2) Temperatures above or below standard temperature that are within the range of operating limitations, if those temperatures could have a negative effect on performance.

(c) Performance data determined in accordance with PEU.B005(b) must account for losses due to atmospheric conditions, cooling needs, other demands on power sources, other external factors, and degradation of power system performance.

#### PEU.B010 Flight Envelope

(a) The applicant must determine the normal, operating and limit flight envelope for each flight configuration during operations;

(b) The flight envelopes determination must account for the most adverse conditions for each

flight configuration of the aircraft.

**PEU.B015 Take-off Performance**

The applicant must determine take-off performance accounting for:

(a) Operating flight envelope;

(b) Obstacle safety margins.

**PEU.B020 Climb Performance**

(a) The design must comply with the following minimum climb performance out of ground effect
(1) In the normal flight envelope;

(2) If applicable, in the operating envelope.

(b) The applicant must determine critical climb performance within the maximum permitted condition of a power system failure.

**PEU.B025 Landing**

(a) The applicant must determine the following, at critical combinations of flight parameters within the operating limits:
(1) The area required to land and come to a stop, assuming approach paths applicable to the aircraft;
(2) The approach and landing speeds, configurations, and procedures, which allow the aircraft to land within the published landing area consistently and without causing damage or injury, and which allow for interrupted landing or go-around.

(b) The landing must be made without tendency to bounce, nose over, ground loop, or others.

**B.2 Flight Features**

**PEU.B030 Controllability and Maneuverability**

(a) The aircraft must be controllable and maneuverable, without requiring exceptional piloting skills, alertness, or strength, within the operating flight envelope and must be controllable and maneuverable within the limit flight envelope:
(1) At all loading conditions for which certification is requested;
(2) During all phases of ground or flight operations;
(3) In all degraded Flight Control System operating modes;

(4) The applicant must demonstrate controllability in wind speed from zero to a wind limit appropriate for the aircraft type.
(b) It must be possible to make a smooth transition from one flight condition to another without danger of exceeding the limit flight envelope.

**PEU.B035 Flying Qualities**

(a) Within its flight envelopes, the aircraft must show suitable stability and control feel, in all axes;
(b) Within its flight envelopes, no aircraft may exhibit any divergent stability characteristic or otherwise endanger the aircraft and its occupants;
(c) The UA must be designed, without requiring exceptional piloting skills, alertness, or strength to keep stability during the operation of the UA by remote pilots.

**PEU.B040 Ground and Water Handling Characteristics**

During the aircraft's intended ground or water operations, the aircraft should feature satisfactory maneuverability in all axes during its take-off and landing (ground or water).

**PEU.B045 Vibration**

Each part of the aircraft must be free from excessive vibration throughout the limit flight envelope.

**PEU.B050 Flight in Icing Conditions**

(a) An applicant who requests certification for flight in icing conditions must demonstrate that the aircraft can be safely operated in the icing conditions for which certification is requested;
(b) The applicant must provide a means to detect any icing conditions for which the aircraft is not certified to operate and demonstrate the aircraft's ability to avoid or exit those conditions;
(c) The applicant must develop an operating limitation to prohibit intentional flight, including take-off and landing, into icing conditions for which the aircraft is not certified to operate.

**PEU.B055 Operating Limitations**

The following flight information must be established:
(a) Operating limitations, procedures and instructions necessary for the safe operation of the aircraft;
(b) Essential speed and performance information.

# Subpart C Structures

## C.1 General

### PEU.C000 Structural Design Envelope

The applicant must determine the structural design envelope, which describes the range and limits of aircraft design and operational parameters for which the applicant will show compliance with the requirements of this Subpart. The applicant must account for all aircraft design and operational parameters that affect structural loads, strength, durability, and aeroelasticity, including:

(a) Structural design airspeeds, landing descent speeds, and any other airspeed limitation for which the applicant must show compliance to the requirements of this subpart. The structural design airspeeds must
(1) If part of the lift is generated by a wing, be sufficiently greater than the stalling speed of the aircraft to safeguard against loss of control in turbulent air, if applicable;
(2) Provide sufficient margin for the establishment of practical operational limiting airspeeds.
(b) A designed maneuvering load factor no less than the maneuvering load factor which may appear in the structural design envelope;

(c) Properties of inertia, including mass, center of gravity, and moment of inertia:

(1) The applicable mass and center of gravity envelope, within the operating limitations;

(2) Mass variations and distribution of the passengers and the luggage.

(d) Features of the aircraft's Flight Control System, including the motion scope and tolerance of the control surface, the high-lift devices, and other movable surfaces;

(e) At each altitude within the operating limitations;

(f) The rotational speed scope of the lift/thrust in either powered or unpowered scenarios.

### PEU.C005 Interaction of Systems and Structures

For aircraft equipped with systems that affect structural performance, either directly or as a result of failure or malfunction, the applicant must account for the influence and failure conditions of these systems when showing compliance with the requirements of this Subpart.

## C.2 Structural Loads

### PEU.C010 Structural Design Loads

(a) The applicant must determine structural design loads resulting from likely externally or internally applied pressure, force or moment which may occur in flight, ground and water operations, ground- and water- handling, and while the aircraft is parked or moored;

(b) The magnitude and distribution of these loads must be based on established physical principles.

### PEU.C015 Flight Load Conditions

Critical flight loads must be established within the following conditions:

(a) Atmospheric gusts where the magnitude and gradient of these gusts are based on measured gust statistics.;

(b) Symmetrical and asymmetric maneuverability;

(c) Asymmetric thrust or lift caused by the critical failure of the power.

### PEU.C020 Ground and Water Load Conditions

The applicant must determine the structural design loads resulting from taxi (if applicable), take-off, landing (either on ground or water), and handling conditions on the applicable surface in normal and adverse attitudes and configurations.

### PEU.C025 Component Load Conditions

The applicant must determine the loads acting upon all relevant structural components, including power and electrical system frames and their supporting structure, in response to:

(a) The load conditions in PEU.C010, C015, and C020;

(b) Interaction of systems and structures;

(c) Limit input torque from lift/thrust units at any rotational speed;

(d) The combination between the load caused by the powerplant and the combination of flight load;

(e) The load caused by the sudden failure of power device.

**PEU.C030 Limit and ultimate loads**

The applicant must determine:

(a) The limit loads, which are equal to the structural design loads, unless otherwise provided by other articles and sections in this *Special Conditions*;

(b) The ultimate loads, which are equal to the limit loads multiplied by a 1.5 times factor of safety, unless otherwise provided.

**C.3 Structural Performance**

**PEU.C035 Structural Strength**

The structure must support:

(a) Limit loads, without interference with the safe operation of the aircraft and detrimental or permanent deformation;

(b) Ultimate loads.

**PEU.C040 Structure Durability**

(a) The applicant must develop and implement inspections or other procedures to prevent structural failures due to foreseeable causes of strength degradation, which could result in serious or fatal injuries, or extended periods of operation with reduced safety margins. Each of the inspections or other procedures developed under PEU.C040 must be included in the Airworthiness Limitations Section of Instructions for Continued Airworthiness required by PEU.G025;

(b) The procedures developed for compliance with PEU.C040(a) must be capable of detecting structural damage before the damage could result in structural failure;

(c) The aircraft must be designed to minimize hazards to the aircraft due to structural damage caused by high-energy fragments from an uncontained lift/thrust unit or rotating-machinery failure;

(d) Provisions for in-service monitoring of parts having an important bearing on safety in operations must be established.

**PEU.C045 Aeroelasticity**

(a) The aircraft must be free from flutter, control reversal, and divergence under following

conditions:

(1) At all speeds within and sufficiently beyond the structural design envelope;

(2) Any configuration and operation conditions;

(3) Accounting for critical degrees of freedom;

(4) Accounting for any critical failures or malfunctions.

(b) Tolerances for all quantities that affect flutter must be determined.

**PEU.C050 Design and Construction Principles**

(a) Each part, article, and assembly must be designed for the expected operating conditions of the aircraft;

(b) Design data must adequately define the part, article, or assembly configuration, its design features, and any materials and processes used;

(c) The suitability of each design detail and part having an important bearing on safety in operations must be determined;

(d) The control system must be free from jamming, excessive friction, and excessive deflection when the aircraft is subjected to expected limit air loads;

(e) Every door, canopy, and exit must be prevented from opened during flight, unless it is shown there’s no hazard when opened during flight;

(f) If applicable, the aircraft must be designed to ensure that after a likely bird impact the capability remains to conduct continued safe flight or a controlled emergency landing.

**PEU.C055 Protection of Structure**

(a) Each part of the aircraft, including small parts such as fasteners, must be protected against deterioration or loss of strength due to any cause likely to occur in the expected operational environment;

(b) Each part of the aircraft must have adequate provisions for ventilation and drainage;

(c) For each part that requires maintenance, preventive maintenance, or servicing, the applicant must incorporate a means into the aircraft design to allow such actions to be accomplished.

**PEU.C060 Materials and Processes**

(a) The applicant must determine the suitability and durability of materials used for parts, articles, and assemblies, the failure of which could prevent continued safe flight and landing, accounting for the effects of likely environmental conditions expected in service;

(b) The methods and processes of fabrication and assembly used must produce consistently sound structures. If a fabrication process requires close control to reach this objective, the applicant must define the process with an approved process specification as part of the design data;

(c) Except as provided for in PEU.C060(f) and (g), the applicant must select design values that ensure material strength with probabilities that account for the criticality of the structural element. Design values must account for the probability of structural failure due to material variability;

(d) If material strength properties are required, a determination of those properties must be based on sufficient tests of material meeting specifications to establish design values on a statistical basis;

(e) If environmental effects are significant on a critical component or structure under normal operating conditions, the applicant must determine those effects;

(f) Design values, greater than the minimums specified by this subpart, may be used, where only guaranteed minimum values are normally allowed, if a specimen of each individual item is tested before use to determine that the actual strength properties of that particular item will equal or exceed those used in the design;

(g) An applicant may use other material design values if specifically approved by the CAAC.

**PEU.C065 Special Factors of Safety**

(a) The applicant must determine a special factor of safety for each critical design value for each part, article, or assembly for which that critical design value is uncertain, and for each part, article, or assembly as any condition as following:

(1) Likely to deteriorate in service before normal replacement;

(2) Subject to appreciable variability because of uncertainties in manufacturing processes or inspection methods.

(b) The applicant must determine a special factor of safety using quality controls and specifications that account for each:

(1) Type of application;

(2) Inspection method;

(3) Structural test requirement;

(4) Sampling percentage;

(5) Process and material control.

(c) The applicant must multiply the highest pertinent special factor of safety in the design for each part of the structure by each limit load and ultimate load, or ultimate load only, if there is no corresponding limit load, such as occurs with emergency condition loading.

**PEU.C070 Emergency**

(a) The aircraft, even when damaged in an emergency landing, must protect each occupant against injury that would preclude egress during following conditions:

(1) Properly using safety equipment and features provided for in the design;

(2) The occupant experiences ultimate static inertia loads likely to occur in an emergency landing;

(3) Items of mass, including power system, electric system, within or adjacent to the cabin, that could injure an occupant, experience ultimate static inertia loads likely to occur in an emergency landing.

(b) The emergency landing conditions specified in paragraph (1) and (a)(2) of this section must:

(1) Including dynamic conditions that are likely to occur in an emergency landing;

(2) Not generate loads experienced by the occupants, which exceed established human-injury criteria for human tolerance due to restraint or contact with objects in the aircraft.

(c) The aircraft must provide protection for all occupants, accounting for likely flight, ground, and emergency landing conditions;

(d) Each occupant protection system must perform its intended function and not create a hazard that could cause a secondary injury to an occupant. The occupant protection system must not prevent occupant egress or interfere with the operation of the aircraft when not in use;

(e) Each baggage and cargo compartment must:

(1) Be designed for its maximum weight of contents and for the critical load distributions at the maximum load factors corresponding to the flight and ground load conditions determined under this *Special Conditions*;

(2) Has a means to prevent the contents of the compartment from becoming a hazard by

impacting occupants or shifting;

(3) Protect any control device, wiring, lines, equipment, or accessories whose damage or failure would prevent continued safe flight and landing;

(4) Be designed so that a fire does not preclude continued safe flight or emergency landing.

(f) Protection is in place for any propulsion system or electrical system component whose destruction or damage may affect its safe use or passenger safety.

## Subpart D Design and Construction

### PEU.D000 Flight Control Systems

(a) The Flight Control System must be designed to:

(1) Protect against likely hazards;

(2) Operate easily, smoothly, and positively enough to allow proper performance of their functions;

(3) The flight controls from remote crew to aircraft should conform to the control habits from traditional aircraft;

(4) Provide required instruction information, so remote crew can maintain flight safety.

(b) Trim systems, if installed, must be designed to protect against inadvertent, incorrect, or abrupt trim operation.

### PEU.D005 Landing Gear Systems

(a) The landing gear must be designed to provide stable support and control to the aircraft during surface operation;

(b)The landing gear system must have a reliable means of holding the aircraft in position when parked;

(c) The landing gear must be designed to account for likely system failures and likely operation environment (including anticipated limitation exceedances and emergency procedures);

(d) The aircraft must have a reliable means of stopping the aircraft with sufficient kinetic energy absorption to account for landing and take-off, in all approved conditions;
(e) For aircraft that have a system that actuates the landing gear, there must be:
(1) A positive means to keep the landing gear in the landing position;
(2) An alternative means available to bring the landing gear in the landing position when a nondeployed system position would be a hazard.

### PEU.D010 Buoyancy

(a) If certification for intended operations on water is requested, the aircraft must:
(1) provide buoyancy of 80 % in excess of the buoyancy required to support the maximum weight of the aircraft in fresh water;
(2) have sufficient margin so that the aircraft will stay afloat at rest in calm water without capsizing in case of a likely float or hull flooding.

(b) If certification for emergency flotation is requested, the aircraft must:
(1) be equipped with an approved emergency flotation system;
(2) have flotation units of the emergency flotation system and their attachments to the aircraft capable of withstanding the applicable water loads;
(3) be shown to maintain its intended floating attitude in the sea conditions selected by the applicant.
(c) If certification for ditching is requested, the aircraft must:
(1) be equipped with an approved emergency flotation system that does not rely on manual activation;
(2) withstand the applicable water loads;
(3) be shown to have a safe water entry and to maintain its intended buoyancy attitude in the sea conditions selected by the applicant.

**PEU.D015 Evacuating Facilities**

The aircraft must be designed to:
(a) Facilitate rapid and safe evacuation of the aircraft in conditions likely to occur following an emergency landing, including on water if an emergency buoyancy system is included;
(b) Have means of egress (openings, exits or emergency exits) that can be readily located and opened from the inside and outside. The means of opening must be simple and obvious. If an emergency flotation system is included, the means of egress must be above the water in the intended floating attitude. Additionally, if certification for ditching is requested, the means of egress must be usable in all stable floating attitudes；
(c) Have easy access to emergency exits when present.

(d) With the equipment of the on-water emergency floating system, the evacuation facility must be higher than the water surface in the aircraft’s intended floating posture after it falls on water. To apply for the certification of ditching, the evacuating facilities should be applicable in all stable floating postures.

**PEU.D020 Passenger Physical Environment**

(a) The aircraft must be designed to:

(1) Allow clear communication between the flight crew and passengers;

(2) Protect the occupants against serious injury due to hazards, associated with systems and equipment, including while embarking and disembarking;

(3) Protect the occupants against serious injury due to breakage of windshields, windows, and canopies.

(b) The aircraft must provide each occupant with air at a breathable pressure, free of hazardous concentrations of gases, vapors and smoke during normal operations and likely failures;

(c) If an oxygen system is installed in the aircraft, it must:

(1) effectively provide oxygen to each user to prevent the effects of hypoxia;

(2) be free from hazards in itself, in its method of operation, and its effect upon other components.

**PEU.D025 Fire Protection**

(a) The aircraft must be designed to minimize the risk of fire initiation due to:
(1) anticipated heat or energy dissipation or system failures or overheat that are expected to generate heat sufficient to ignite a fire;
(2) ignition of flammable fluids, gases or vapors;
(3) fire-propagating or -initiating system characteristics (e.g. oxygen systems);

(4) a survivable emergency landing.

(b) The aircraft must be designed to minimize the risk of fire propagation by:
(1) application of self-extinguishing, flame-resistant, or fireproof materials that must meet requirements of the application, location and certification level;

(2) Facilities must be equipped to prevent the high-temperature energy released by the powerplant from spreading to the cabin or affecting the normal operations of other propulsion system components, key equipment, key structures;

(3) If feasible, an aircraft must account for fire-containing design with the equipment of fire-extinguishing facilities and able to send fire or smoke alert to the remote crew;

(4) The cabin must be equipped with fire-extinguishing facilities to be conveniently located, approached, and used by passengers.

**PEU.D030 Fire Protection in Designated Fire Zones and Surrounding Zones**

(a) Flight critical systems, lift/thrust unit mounting, and other structures within or adjacent to designated fire zones must be capable of withstanding the effects of a fire;
(b) A fire or other release of stored energy in a designated fire zone must not preclude continued safe flight and landing or a controlled emergency landing;
(c) Terminals, equipment, and electrical cables used during emergency procedures must be fire-resistant.

**PEU.D035 Protection Against Lightning and Static Electricity**

(a) Unless it is shown that exposure to lightning is unlikely, the aircraft must be protected against catastrophic effects of lightning;

(b) If a lightning environment is not included in the intended operation environments, restrictive measures must be formulated to prohibit the aircraft from exposure to lightning, during flight including the take-off and landing;

(c) The aircraft must be designed to protected against catastrophic effects of static electricity.

**PEU.D040 Design and Structure Information**

The following design and construction information must be established:

(a) Operation limitations, procedures, and instructions necessary for the safe operations of the aircraft;

(b) Essential instrument markings or placards;

(c) Any additional information necessary for the safe operations of the aircraft;

(d) Inspections and maintenance to assure continued safe operations.

## Subpart E Lift/Thrust System Installation

### PEU.E000 Lift/Thrust System Installation

(a) For the purpose of this Subpart, the aircraft lift/thrust system installation must include each component that is necessary for generating lift/thrust and affects lift/thrust safety, and other relevant parts;

(b) A part of the Lift/Thrust Installation installed on a UA should be applicable to the specific design and proposed purposes of the aircraft and conform to the standards and safety level acceptable by the CAAC;

(c) The applicant must construct and arrange each lift/thrust system installation to account for:
(1) all likely operating conditions, including foreign object threats;
(2) sufficient clearance of moving parts to other aircraft parts and their surroundings;
(3) likely hazards in operation, including hazards to ground personnel;

(4) Vibration and fatigue.

(d) Hazardous accumulations of fluids, vapors or gases must be isolated from the aircraft and personnel compartments and must be safely contained or discharged;

(e) Installations of lift/thrust system components that deviate from the component limitations or installation instructions must be shown to be safe;

(f) For the purposes of this Subpart, ‘energy’ means any type of energy for the lift/thrust unit, including any kind of electric current.

### PEU.E005 Power or Lift/Thrust Control Systems

The power or lift/thrust control systems refer to the systems to set or regulate the power or lift/thrust.

(a) Within the scope of the operation limits of the UA, the power or lift/thrust control systems should not manifest unsafe features in the UA’s normal or emergencies;

(b) A single-point failure should not exist in the power or lift/thrust control systems. Any possible combination of failures should not impede the UA from its continuous safe flight and landing, unless there is an extremely low probability of its occurrence;

(c) Any input from the remote crew to the power or lift/thrust control systems should be prevented, unless it leads to no unsafe situation;

(d) A measure should be provided to the remote crew for confirming the work status of the power or lift/thrust control systems.

**PEU.E010 Harmfulness Evaluation of the Lift/Thrust System Installation**

The applicant should carry out an independent evaluation on each propulsion system and evaluate the connection between the installation and other systems, so as to indicate that the harmful consequence caused by any possible failure of a propulsion system, part, or accessory will not cause the following situations:

(a) Impede the UA's continuous safe flight or landing, or it should minimize the harmfulness if the continuous safe flight or the landing cannot be guaranteed;

(b) Cause grievous harmfulness which can have been avoided;

(c) Require the remote crew to act immediately for the continuous action of any remaining propulsion systems.

**PEU.E015 Lift/Thrust System Installation Ice Protection**

(a) The aircraft and lift/thrust system installation design must prevent any accumulation or shedding of ice or snow that would adversely affect lift/thrust system operation;

(b) The lift-thrust system installation design must prevent any accumulation or shedding of ice or snow that would adversely affect lift/thrust system operation under the icing conditions for the application of certification.

**PEU.E020 Lift/Thrust System Operational Characteristics**

(a) The installed lift/thrust system must operate without any hazardous characteristics during normal and emergency operation within the range of operation limitations for the aircraft and lift/thrust system;

(b) The detachment or explosion of a movable part of the lift/thrust system installation should not cause harmfulness to passengers or affect the safe landing of the UA.

**PEU.E025 Batteries and the Power Distribution Systems**

(a) Each system must:
(1) be designed to provide independence between multiple energy storage and supply systems so that a failure, including fire, of any one component in one system will not result in the loss of energy storage or supply of another system;
(2) be designed to prevent catastrophic events due to lightning strikes taking into account direct and indirect effects for aircraft unless it is shown that exposure to lightning is unlikely;

(3) provide energy to the lift/thrust system installation with adequate margins to ensure safe functioning under all permitted and likely operating conditions, and accounting for likely component failures;
(4) Provide the relevant information to the remote crew and provide uninterrupted supply of that energy when the system is correctly operated, accounting for likely energy fluctuations;
(5) Provide a means to safely remove or isolate the battery within the system;
(6) Be designed to retain the energy under all likely operating conditions and minimize hazards to the occupants and people on the ground during any survivable emergency landing. If necessary, failure due to overload of the landing system must be taken into account.

(b) Each battery system must:

(1) Withstand the loads under likely operating conditions without failure, accounting for installation;

(2) Effective protection against any possible explosion or fire accident, accounting for installation;

(3) be isolated from personnel compartments and protected from likely hazards;
(c) Each charging system must be designed to:
(1) prevent improper refilling or recharging;
(2) prevent contamination of batteries during likely operating conditions;
(3) prevent the occurrence of any hazard to the aircraft or to persons during charging.
(d) Likely errors during ground handling of the aircraft must not lead to a hazardous loss of electric power.

**PEU.E035 Lift/Thrust System Installation Fire Protection**

There must be means to isolate and mitigate hazards to the aircraft in the event of a lift/thrust system fire or overheat in operation.

**PEU.E040 Lift/thrust system installation information**

The following lift/thrust system installation information must be established:

(a) Operating limitations, procedures and instructions necessary for the safe operation of the aircraft;
(b) the need for instrument markings or placards;
(c) any additional information necessary for the safe operation of the aircraft;

(d) Inspection and maintenance to assure continued safe operation;

(e) Information related to electrical/lift/thrust device configuration;

(f) Techniques and associated limitations for lift/thrust unit starting and stopping;

(g) Electric energy level information to support energy management, including any possible part failure within the system.

## Subpart F Systems and Equipment

### PEU.F000 UA's System Requirements

(a) PEU.F000, F005, F010, F015, and F030 are general requirements applicable to systems and equipment installed in the aircraft. Except for the above sections, other sections in this subpart are only applicable to the onboard systems and equipment of the UA;

(b) The following requirements should be met for the design and installation of the systems and equipment necessary for the safe operations of the UA in case of the operation types in its application for certification:

(1) The safety level applicable to an UA's system performance requirements should be met;

(2) Intended functions should be completed with the certified operation and environment limits.

### PEU.F005 Functions and Installation

Every piece of equipment should be installed with reference to its restrictions and for the purposes of its intended functions.

### PEU.F010 Systems, Equipment, and Installations

(a) The following requirements should be met in considering the systems, equipment, and installation of the UA's system as contained in PEU.F000 (a) individually or collectively with other systems and equipment:

(1) each catastrophic failure condition is extremely improbable and does not result from a single failure;
(2) each hazardous failure condition is extremely remote;

(3) each major failure condition is remote.

(b) The operations of the systems and equipment not covered by PEU.F000(b) must not cause a hazard to the aircraft or its occupants throughout the operating and environmental limits for which the aircraft is certified;

(c) Provisions for in-service monitoring of equipment and systems which failure may have hazardous or catastrophic consequences must be established.

### PEU.F015 Protection of the Operation Scope

Any possible failure of the UA's system or any external system supporting the operations should

not cause the UA to go beyond its intended operation scope.

**PEU.F020 Protection of the Envelope**

(a) The UA should be ensured to maintain its operations within the flight envelope amid the intended operation conditions and to be in line with the system safety goals in PEU.F010;

(b) The protection of the flight envelope should be provided to an UA's all flight stages and maneuverability types;

(c) The limited values of flight parameters should comply with:

(1) Structural limits;

(2) The UA's safe and controllable maneuverable flight under the intended operation conditions and with sufficient tolerances;

(3) Prevented occurrences of dangers and disastrous failures;

(4) Restrictions by the propulsion systems and the electrical systems;

(5) Comprehensive influences by maneuvering, operation features of the propulsion systems and the electrical systems, and other factors.

**PEU.F025 Electrical and electronic system lightning protection**

Unless evidences prove that the UA is unlikely to be exposed to a lightning environment, the UA should be designed to meet the following requirements:

(a) each electrical or electronic system that performs a function, the failure of which would prevent continued safe flight and landing, must be designed and installed such that:

(1) the flight safety at the aircraft level is not adversely affected during and after the time the aircraft is exposed to lightning;

(2) the system recovers normal operation of that function in a timely manner after the aircraft is exposed to lightning unless the system's recovery conflicts with other operational or functional requirements of the system.

(b) each electrical and electronic system that performs a function, the failure of which would reduce the capability of the aircraft or the ability of the remote crew to respond to an adverse operating condition, must be designed and installed such that the system recovers normal operation of that function in a timely manner after the aircraft is exposed to lightning.

**PEU.F030 High-Intensity Radiated Fields (HIRF) Protection**

The following requirements should be met by the design of the UAS.

(a) Each electrical and electronic system that performs a function, or affects the Ground Control Station from achieving its intended functions, the failure of which would prevent continued safe flight and landing, must be designed and installed such that:

(1) the function at the aircraft level is not adversely affected during and after the time the aircraft is exposed to the HIRF environment;

(2) the system recovers normal operation of that function in a timely manner after the aircraft is exposed to the HIRF environment, unless the system's recovery conflicts with other operational or functional requirements of the system.

(b) Each electrical and electronic system that performs a function, the failure of which would reduce the capability of the aircraft or the ability of the flight crew to respond to an adverse operating condition, must be designed and installed such that the system recovers normal operation of that function in a timely manner after the aircraft is exposed to the HIRF environment.

**PEU.F035 Electrical Power Sources and Electrical Power Distribution Systems**

The electrical power sources and electrical power distribution systems for any system, as applicable, must be designed and installed to:

(a) supply the power required for operation of connected loads during all intended operating conditions;

(b) prevent the single-point failure or malfunction of the electrical power source systems, the electrical power distribution systems, or other electrical systems from disabling the system to supply electrical power to important loads necessary for the UA's continued safe flight and landing;

(c) have enough electrical power to be supplied to all important loads during the periods necessary for the continuous safe flight and landing, if there is a failure of the electrical power supply from the main electrical power source.

**PEU.F040 The UA's Lights and Lighting**

(a) Any position and anti-collision lights, if required by operational rules, must have the intensities, flash rate, colors, fields of coverage, and other characteristics to provide sufficient time for another aircraft to avoid a collision;

(b) Any position lights, if required by operational rules, must include a red light on the left side of the aircraft, a green light on the right side of the aircraft, spaced laterally as far apart as practicable, and a white light facing aft, located on an aft portion of the aircraft fuselage or on the wing tips;

(c) Taxi and landing lights, if required, must be designed and installed so they provide sufficient light for night operations;

(d) The design and installation of the interior or exterior lighting of the UA should ensure necessary lighting conditions for the passengers in the following situations:

(1) Executing an instruction from the remote crew;

(2) Carrying out an emergency evacuation;

(3) Using the safety equipment in PEU.F045.

(e) Adverse effects on the remote crew's performance of functions and abilities should be minimized by the design and installation of the lighting of the UA's system.

**PEU.F045 Safety Equipment**

Safety and survival equipment, required by the operating rules, must be reliable, readily accessible, easily identifiable, and clearly marked to identify its method of operation.

**PEU.F050 Equipment with High-Energy Rotors**

The passengers and UA should be protected from the harmfulness of the non-contained fragments by the design and installation of equipment consisting of high-energy rotors.

**PEU.F055 Recorder**

(a) The UAS should have the function to reliably record and preserve important data of the UA's operations;

(b) For the recorder which should be installed according to the civil aviation operation rules, the recorder installed on the UA should meet the following:

(1) It is installed so as to ensure accurate and intelligible recording and appropriate safeguarding of the data supportive for accident investigation, considering conditions encountered during crash, water immersion or fire;

(2) It is powered by the most reliable power source and remains powered for as long as possible without jeopardizing service to essential or emergency loads and emergency operation of the aircraft;

(3) The single-point electrical failure outside the recorder should not cause the recorder to stop working;

(4) It includes features to facilitate the localization of a memory medium after an accident;

(5) The recorder's exterior should have clearly identifiable marks and signs;

(6) It is installed so that it automatically records when the aircraft is capable of moving under its own power;

(7) It records in an accepted format.

(c) The Ground Control Station should have real-time acquisition and storage of important data on the UA's operations. In case of the lack of a recorder complying with the requirement of section (b) on the UA, the UA's system used to collect and remotely transmit important data should meet the following requirements:

(1) It is powered by the most reliable power source and remains powered for as long as possible without jeopardizing service to essential or emergency loads and emergency operation of the aircraft;

(2) The single-point electrical failure on the outside should not cause the data collection and remote transmission system to stop working；

(3) It is installed so that it automatically records when the aircraft is capable of moving under its own power;

(4) It records in an accepted format.

**PEU.F060 Flight Control System**

Consisting of sensors, actuators, computers, and other relevant parts controlling the altitude, speed, trajectory, and spatial location, the Flight Control System should meet the following requirements:

(a) Ensuring that the aerial craft is able to complete the flight route within the intended operation scope according to the flight plan;

(b) Ensuring that the UA is operated within the flight envelope required by PEU.B010 in all flight stages and achieves the protection of the flight envelope required by PEU.F020;

(c) Functions of the Flight Control System should not be achieved its dependence on the data links. In case of abnormal instructions and control, the abnormal procedures in PEU.F065 should meet the requirement of this section;

(d) The change-over information of the flight control mode and of the control system, and the

relevant important information of other flight control systems should be effectively monitored. The remote crew should be effectively informed of the system failure which may affect flight safety;

(e) For an UA equipped with multiple flight control systems, the failure of partial systems should not affect achieving the function of the normal work system.

**PEU.F065 Command, Control, and Communication Contingency**

(a) Where the safe operation of the UA requires command, control and communication functionality, the UAS must initiate adequate contingency procedures following a command, control or communication function loss or a degraded status which no longer ensures safe operation of the UA by the remote crew;

(b) The contingency procedures must be specified in the Flight Manual for the remote crew for each operational situation.

**PEU.F070 Passenger Information Notification**

The design of the UA should ensure the remote crew's abilities in communicating with the passengers during the UA's operations, with audio, images, marks, signs, and other forms providing passengers with the flight status information, warning information, and safety instruction information necessary for ensuring flight safety.

**PEU.F075 Detection and Avoidance**

The UA's system should be capable to detect and avoid potential conflicts and other dangers during its operations.

(a) The UA's system should detect and avoid the following risks during its operations:

(1) Any terrain or obstacle which threatens the UA's operation safety;

(2) Adverse weather conditions exceeding operation restrictions, unless evidence shows that the UA is unlikely to operate amid weather conditions exceeding operation restrictions;

(3) Other UAs not further than the safety distance.

(b) Measures to be taken by the UA's system to avoid the risks as described in section (a) should be in line with the avoidance rules of aviation operations;

(c) Avoidance by the UA's system should not cause the UA to exceed the envelope limits required by PEU.F020(c);

(d) The remote crew should be informed of the detection and avoidance information of the UAS;

(e) The remote crew should be informed of in case of the UA's deviation from the intended flight plan due to detection and avoidance;

(f) The Flight Manual should contain the operation, control restrictions, use procedures and requirements on detection and avoidance.

## Subpart G The Remote Crew Interface and Information

### PEU.G000 Ground Control Station Integration

(a) This subpart is applicable to the PUAS controlled by the remote crew;

(b) The type design of the PUAS shall specify the Ground Control Station design and identify all equipment and systems of the Ground Control Station that are essential for the safe operations of the remote crew to control the PUAS;

(c) The type design of the PUAS shall specify the design of Ground Control Station to the safety level required to compliance with the *Special Conditions, and* identify the safety assurance level;

(d) All necessary instructions, information, and requirements for the safety and accurately interface between the UA and the Ground Control Station must be established;

(e) Provisions and procedures for the safe operation and applicable configuration management, storage, and transfer of the Ground Control Station need to be established;

(f) Procedures for the installation and maintenance of the Ground Control Station shall be provided in the Instruction for Continued Airworthiness;

(g) The Applicant shall perform the integration test with all approved modes of the Ground Control Station as necessary to verify the validity of the declared conditions and limitations to ensure the Ground Control Station will operate satisfactorily and reliably using the data link in the anticipated operating conditions;

(h) The Aircraft Flight Manual shall specify all approved part numbers and software versions of the Ground Control Station to be used on the operations of the UA.

### PEU.G005 Flight, Navigation, and Powerplant Instruments

(a) Installed systems must provide necessary information during each phase of flights to the remote crew who sets or monitors the flight, navigation, and parameters of the powerplant. This information must:

(1) Be presented in a manner that the remote crew can monitor the parameters and determine trends, as needed, to operate the aircraft;

(2) Include limitations, unless the limitation cannot be exceeded in all intended operations;

(b)The primary display of the parameters of the flight and powerplant system cannot be suppressed under any normal operating modes.

**PEU.G010 Installation and Operation Information**

(a) Each installed equipment related to the remote crew interface must be labelled, including its identification, function, or operating limitations, or any combination of these factors;

(b) There must be a discernible means of providing system operating parameters required to control and monitor the UA, including warnings, cautions, and normal indications, to the remote crew;

(c) Information concerning an unsafe system operating condition must be provided in a timely manner to the remote crew responsible for taking corrective action. The information must be clear enough to avoid likely remote crew errors;

(d) Information related to safety equipment is easily identifiable and its method of operation is clearly marked.

**PEU.G015 Markings and Placards**

(a) The PUAS must display in a conspicuous manner any placard and marking necessary for operation;

(b) The design must clearly indicate the safety information and the function instruction of the PUAS and the Ground Control Station;

(c) The applicant must include instrument marking and placard information in the Aircraft Flight Manual.

**PEU.G020 Aircraft Flight Manual**

The applicant must provide an PUAS Aircraft Flight Manual that must be delivered with each PUAS.

(a) The Aircraft Flight Manual contains at least the following information:

(1) Operating limitations of the PUAS;

(2) Operating procedures of the PUAS;

(3) Performance information;

(4) Loading information;

(5) Instrument markings and placards information;

(6) Any other information necessary for safe operation of the PUAS;

(7) Provisions and procedures on transferring, folding and storage.

(b) The information specified in paragraph (a)(1) shall be approved by the CAAC in a manner specified.

**PEU.G025 Instructions for Continued Airworthiness**

(a) The applicant must prepare Instructions for Continued Airworthiness according to appendix A of this *Special Conditions*, which are acceptable for the CAAC;

(b) If the applicant is planning to complete the Instructions for Continued Airworthiness before the first PUAS delivered or the first Standard Airworthiness Certificate issued, the Instructions for Continued Airworthiness can be uncompleted when the type certificate is issued.

## Subpart H Data Links

### PEU.H000 General

Data links for commanding, controlling, communicating with and monitoring the UA should be contained in the PUAS and meet the following requirements:

(a) Can transmit command, control, and communication data from the Ground Control Station to the UA (uplink);

(b) Can transmit monitoring and communication data from the UA to the Ground Control Station (downlink);

(c) Data links involving flight safety should be ensured to be free from any single failure which may result in hazards or severer accidents;

(d) Only legal radio frequency spectrum can be used;

(e) Operation restriction requirements to guarantee the functions of data links should be provided in Aircraft Flight Manual.

### PEU.H005 Data Links Performance

(a) The UA's intended operation scope should be within the cover range of the data links. The data links should have a sufficient budget of links and bandwidth;

(b) The data transmission rate should meet the requirements of data transmission for command, control, communication, and monitor;

(c) The latency in the data links should not produce any adverse effect on the data transmission for command, control, communication, and monitor (video is excluded).

### PEU.H010 Electromagnetic Interference (EMI) and Electromagnetic Compatibility (EMC)

(a) A design should be utilized to reduce the influence of EMI on data links;

(b) Data transmission for command, control, communication, and monitor (video is excluded) should not be affected by EMI;

(c) The data link system should meet the requirements of PEU.F010.

**PEU.H015 Link Status**

(a) The PUAS should monitor the work status of data links, and the status information should be displayed on the Ground Control Station;

(b) Ground Control Station should be effectively informed when data link performance downgrading threats flight safety.

**PEU.H020 Link Redundancy**

(a) Data links for command, control, communication, and monitor (video is excluded) should be redundant;

(b) Different service providers' networks should be adopted for redundancy when using commercial mobile networks.

**PEU.H025 Link Loss**

(a) The PUAS should be able to reconnect automatically when data links lose. This process shall not produce adverse effects on the aircraft's flight safety;

(b) The UA should be able to fly independently during data links loss, and can deal with situations according to the UA's status.

**PEU.H030 Link Switchover**

A switchover among data links or between Ground Control Stations connected to the PUAS should:

(a) Not produce adverse effect on flight safety;

(b) Be achieved automatically or manually. Manual achievement by remote crew has a higher level priority;

(c) Not affect the Ground Control Station sending and receiving important flight parameters with the UA.

**PEU.H035 Data Links Abnormalities**

A handling procedure should be specified against abnormalities of data links. And it should be incorporated into the Aircraft Flight Manual according to PEU.F065.

**PEU.H040 Data Link Security**

(a) Unauthorized access to and control of PUAS via data links should be prevented;

(b) Flight safety should not be affected by malicious attacks on the data links;

(c) Safety and security risks and bugs should be identified, evaluated, and relieved before take-off or in flight.

## Subpart J Ground Control Station

### J.1 General

### PEU.J000 Design and Functions of the Ground Control Station

The Ground Control Station of the PUAS refers to the ground systems and equipment for commanding, controlling, monitoring, and communicating with the UA from the ground, with its design to meet the following requirements:

(a) Its configuration, performance, and reliability should ensure that the remote crew can monitor, control, and communicate with the UA under the Ground Control Station's intended operating environments;

(b) All identified risks of the Ground Control Station have been reduced to the level in consistency with that of the system's safe operations, in accordance with the requirements of PEU.F010;

(c) The design of the Ground Control Station must:

(1) Minimize the possibility of human factors in affecting flight safety;

(2) In case of malfunctions of the Ground Control Station affecting the monitoring and controlling functions, there must be disposal procedures verified effectively, and it cannot have any adverse effect on the flight safety of the UA;

(3) Ensure the connection and control of all the ground control stations without any conflict when an UA connected by sets of the Ground Control Station;

(4) Ensure that the normal operating of the remote crew without requiring exceptional strength, skills, or alertness, or produce overly fatigue in the operating of the Ground Control Station.

### PEU.J005 Physical Environment for the Ground Control Station's Operations

Design or operation regulations should be adopted to ensure that the physical environment for the Ground Control Station's operations should meet the following requirements:

(a) Ensure the normal operations of the Ground Control Station's equipment or operation platform;

(b) Provision of a reliable power source supply for the Ground Control Station's equipment or its software's operation platform;

(c) The lighting conditions of the Ground Control Station should meet the relevant requirement

of PEU.F040(e).

**PEU.J010 Ground Control Station and remote crew**

The following requirements should be met in determining the Ground Control Stations for the PUAS and the minimum remote crew requirements necessary for the operations of the PUAS:

(a) Comply with the relevant requirements of PEU.F000;

(b) The following should be considered in determining the workload of the remote crew for each Ground Control Station:

(1) Controlling and monitoring important on-board systems and equipment;

(2) Emergency procedures for abnormal situations, such as personnel's loss of capacities, and abnormalities with data links etc.;

(3) Command and decision-making, including aircrew resource management.

(c) The requirements for the minimum Ground Control Stations and the minimum remote crew members should be provided for the purpose of safe operations;

(d) Clear definitions should be formulated on the limits of authority and work statuses of different equipment and remote crew, during the operations involving multiple Ground Control Stations and different remote crew.

**J.2 Display, Warning, and Recording**

**PEU.J015 Display on the Ground Control Station**

(a) Important information of the PUAS should be displayed on the Ground Control Station;

(b) All information should be clearly arranged with good visibility in accordance with requirements or optional ways selected by the remote crew;

(c) The display of data which is not displayed all the time should not produce any adverse effect on the Ground Control Station's normal functions or the remote crew;

(d) The refreshing frequency and the data latency for the Ground Control Station's data display should meet the requirements of safe operations;

(e) In case of one Ground Control Station monitoring multiple PUAS, there should be a clear indication of the UA being controlled.

**PEU.J020 Warning Information on the Ground Control Station**

(a) Any information regarding the PUAS's unsafe operation status should be provided in time to the remote crew so as to take corrective measures. All this information should be sufficiently clear to avoid possible human errors;

(b) Important work parameters of the PUAS should be able to be monitored by the Ground Control Station, with warning information for abnormal parameters;

(c) Indication of important breakdowns or warning should be clearly and easily identifiable, with audio warning provided;

(d) In case of the PUAS's failure to complete the flight plan, it should be displayed on the Ground Control Station, with warnings produced.

**PEU.J025 Audio and Image Transmission**

The Ground Control Station should be equipped with the functions to have voice communications with onboard passengers and image monitoring of the cabin's interior and exterior, with the voice communication and image transmission to meet at least the following requirements:

(a) Both the remote crew and the on-board passengers should be able to initiate voice communication, which should be equipped with the functions of automatic answering and manual hang-up;

(b) The minimum requirements of normal transmission should be met in terms of transmission quality, latency rate, and data bandwidth;

(c) Normal transmission of flight parameters and control signals relevant to flight safety should not be affected.

**PEU.J030 The Ground Control Station's Data Recording and Storage**

(a) The Ground Control Station should record important information of the PUAS's operations;

(b) The time criterion for recording data should be synchronous with that of the PUAS;

(c) It should be equipped with the function to read data recorded;

(d) Capacities of recording data should meet the PUAS's operation requirements.

## J.3 Control

### PEU.J035 Flight Plan Choosing and Execution

The UA should fly autonomously according to the flight plan. The following should be guaranteed by the design of the Ground Control Station as the choosing and executing tool of the flight plan:

(a) Equipped with the function of determining the flight scope of the UA;

(b) The choosing of the flight route should be easily recognizable and operable and uneasily subject to errors;

(c) In case of multiple UA connected with and controlled by one Ground Control Station, the Ground Control Station should be able to warn against conflicting flight plan information before take-off.

### PEU.J040 Manual Flight

The following should be guaranteed during the remote crew's direct instruction and control of the UA's flight:

(a) Easy to be used;

(b) Uneasy to have mis-operation;

(c) The entered instructions and control information should be restricted within the UA's flight envelope, during manual flight;

(d) A hierarchy of priorities should be explicitly defined among Ground Control Stations, and no conflicting instructions or hazardous situations should appear.

### PEU.J045 Other Functions

In performing functions other than flight execution, monitoring, and control, the Ground Control Station should not produce any adverse effect on the UA's flight safety.

## J.4 Others

### PEU.J050 The UA's Switching among Ground Control Stations

If the UA allows for its connection with two or more Ground Control Stations and for the

changeover of connection and control, the changeover process should satisfy the following:

(a) The changeover should not produce any adverse effect on the UA's flight safety;

(b) The monitoring, controlling, and recording of the UA should be complete and continuous before and after the changeover.

**PEU.J055 Changeover of the Connection Between the Ground Control Station and the UA**

If the Ground Control Station allows for its connection with and controlling of multiple UAs, it should meet the following during the changeover among the connected UA:

(a) The changeover should not produce any adverse effect on the UA's flight safety;

(b) The monitoring, controlling, and recording of the UA should be complete and continuous before and after the changeover.

# Appendix A

Annex A: Requirements for the preparation of the Instructions for Continued Airworthiness (ICA)

## A.1 General

(a) This appendix specifies requirements for the preparation of the ICA.

(b) The ICA for the PUAS must include the ICA for UA, Ground Control Station, and lift/thrust system, for each appliance required by Chinese Civil Aviation Regulations (CCAR), and any required information relating to the interface of those appliances and products with the PUAS. If the ICA are not supplied by the manufacturer of an appliance or product installed in the PUAS, the ICA for the PUAS must include the information essential to the continued airworthiness of the PUAS;

(c) The applicant must submit to CAAC a program to show how changes to the ICA made by the applicant or by the manufacturers of products and appliances installed in the PUAS will be distributed.

## A.2 Format

(a) The ICA must be in the form of a manual or manuals as appropriate for the quantity of data to be provided;

(b) The format of the manual or manuals must provide for a practical arrangement.

## A.3 Content

The contents of the manual or manuals must be prepared in the Chinese language or any other language accepted by the CAAC. The ICA must contain the following manuals or subpart and information:

(a) PUAS Maintenance Manual or subpart.

(1) Introduction information that includes an explanation of the PUAS's features and data to the extent necessary for maintenance or preventive maintenance;

(2) A description of the UA and its systems and installations (including Ground Control Station, lift/thrust system, and appliances);

(3) Basic control and operation information describing how the PUAS components and systems are controlled and operated (including any special procedures and limitations that applicable);

(4) The procedures that check and upgrade the software's versions;

(5) Servicing information.

(b) Maintenance instructions:

(1) Scheduling maintenance information for the UA and Ground Control Station, which provides the recommended periods at which they should be cleaned, inspected, adjusted, tested, and lubricated, and the degree of inspection, the applicable wear tolerances, and work contents recommended at these periods. However, the applicant may refer to an accessory, instrument, or equipment manufacturer as the source of this information if the applicant shows that the item has an exceptionally high degree of complexity requiring specialized maintenance techniques, test equipment, or expertise. The recommended overhaul periods and necessary cross reference to the Airworthiness Limitations subpart of the manual must also be included. In addition, the applicant must submit an inspection program that includes the frequency and extent of the inspections necessary to provide for the continued airworthiness of the UA;

(2) Troubleshooting information describing probable malfunctions, how to recognize those malfunctions, and the remedial action for those malfunctions;

(3) Information describing the order and method of removing and replacing products and parts with any necessary precautions to be taken;

(4) Other general procedural instructions including procedures for system testing during ground running, symmetry checks, weighing and determining the center of gravity, lifting and shoring, and storage limitations.

(c) Diagrams of structural access plates and information needed to gain access for inspections when access plates are not provided;

(d) Details for the application of special inspection techniques (including radiographic and ultrasonic testing) where such processes are specified by the applicant;

(e) Information needed to apply protective treatments to the structure after inspection;

(f) All data relative to structural fasteners such as identification, discard recommendations, and torque values;

(g) A list of special tools needed;

(h) Special notes for safety handling and emergency handling.

**A.4 Airworthiness Restrictions Subpart**

The ICA must contain a subpart titled Airworthiness Limitations that is segregated and clearly distinguishable from the rest of the document. This subpart must set forth each mandatory

replacement time, structural inspection interval, and related structural inspection procedure required for type certification.

If the ICA consist of multiple documents, the subpart required by this paragraph must be included in the primary manual. This subpart must contain a legible statement in a prominent location that reads “The Airworthiness Limitations subpart is CAAC approved and specifies maintenance required by the related maintenance and operation regulations of Chinese Civil Aviation Regulations (CCAR) unless an alternative program has been approved by CAAC.”

— END —