ATSP CODING:

ORAM - A

OPERATIONAL RISK ASSESSMENT AND MITIGATION FOR UAS OPERATION IN CONTROLLED AIRSPACE

This document defines the additional risk mitigation measures for UAS operations intended to be carried out in controlled airspace for a specific ConOps agreed in writing between the UAS operator and the Air Traffic Service Provider (ATSP) and establishes the coordination procedure to be followed to carry out the aerial activity. Likewise, when this is validated by ENAIRE, it constitutes evidence of the coordination of the aeronautical safety study, in compliance with Article 45.3.c of Royal Decree 1180/2018, and of the cooperation procedure with the ATSP, in accordance with point 2.4.1.c of AMC1 to Article 11 and, UAS.SPEC.040.040.1.b to Part B of the Annex to Commission Implementing Regulation (EU) 2019/947.

The aerial activity of the UAS operator shall comply with the provisions of this document. Any operation that does not fulfil the established conditions shall require further assessment and mitigation of operational risk and coordination with the ATSP, notwithstanding to any sanctions that may be imposed for non-compliance with the agreed-upon measures.

# UAS OPERATOR AND AIR TRAFFIC SERVICE PROVIDER'S DETAILS

Contact details for the purpose of strategic coordination and evaluation of this document between the two parties:

* 1. UAS operator's details

|  |  |
| --- | --- |
| UAS operator's registration number | To be fulfilled by the UAS operator |
| Name or company name | Name or company name |
| Contact person | Name and surnames (position) |
| Telephone number | Tel. |
| Email | Email |

* 1. Air traffic service provider's details

|  |  |
| --- | --- |
| Name or company name | ENAIRE |
| Contact | ENAIRE Planea / drones.safety@enaire.es / [web](https://www.enaire.es/servicios/drones/lo_necesario_para_volar_tu_dron/volar_espacio_aereo_controlado_enaire) |

# Definition of the concept of operation (CONOPS) and scope of application

* 1. CONOPS

Operations shall be compliant with the following CONOPS:

|  |
| --- |
| OPEN CATEGORY (subcategories A1, A2, A3) |
| VLOS |
| DAY-TIME and/or NIGHT-TIME |
| WITHIN CONTROLLED AIRSPACE |
| OUTSIDE THE SAFETY DISTANCES TO AERODROMES[[1]](#footnote-2) |
| With UAS/RPAS of MTOM <25 kg |
| MAXIMUM HEIGHT 60 m |

This document is applicable to those aerial operations with remotely piloted aircraft that fulfil the following parameters:

* The **UAS operator** is **registered**.
* Operations will be conducted according to the **open category**, subcategories A1, A2 o A3

|  |  |
| --- | --- |
| **UAS** | Operation |
| **C-Class** | **MTOM** | Subcategory | Operational restrictions |
| Privately built | <250 g | A1 | * May overfly uninvolved persons (it should be avoided when possible).

 Overflying assemblies of people is not permitted |
|  Legacy[[2]](#footnote-3) <250g |
| C0 |
| C1 | <900 g | * No flight expected over uninvolved persons (if it happens, overflight should be minimised)
* No flight over assemblies of people
 |
| C2 | <4 kg | A2 | * Must not overfly uninvolved persons
* Maintain a horizontal distance of 30 m from uninvolved persons (can be reduced to 5 m if the low-speed mode is activated)
* Maintain flight altitude below 120 m above ground level
 |
| C3 | <25 kg | A3 | * Must not overfly uninvolved persons
* Maintain a horizontal distance of 150 m from:
	+ Residential areas
	+ Commercial areas
	+ Industrial areas
	+ Recreational areas
 |
| C4 |
| Privately built |
| Legacy[[3]](#footnote-4) >250g |

* Height will be limited to a **maximum of 60 m** above ground level.
* The operations will take place **in controlled airspace.**
* They will be carried out **outside the safety distances to airports**, aerodromes and heliports defined in the appendix to this document.
* UAS operations will not be autonomous.
* The operations will be conducted within visual line of sight (VLOS).
* They will be **day-time and/or night-time** operations.
* The operation **will not be** carried out with FPV system. // The operation **may be** conducted with FPV system. For these operations, UA observers will be present to ensure VLOS.
	1. Scope of application

This coordination is valid within the controlled airspace and aerodrome information service managed by the aerodrome ATS units:

|  |
| --- |
| Units where ENAIRE provides air traffic services |

or

|  |  |
| --- | --- |
| **Type of Airspace** | **Comments** |
| Example: CTR Madrid |  |

Complete table in case of specific EARO

# UAS DESCRIPTION AND SEMANTIC MODEL

This section lists the UAS models to be used by the UAS operator and the description of the semantic model with the maximum flight geography, and the minimum contingency volume and air risk buffer that will be maintained.

* 1. Description of the UAS

The following table lists the UAS models to be used in the CONOPS operations described above:

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | UAS manufacturer and model\* | Configuration | C-Class (if it applies) | MTOM (kg) | Dimension (m) | Speed (m/s) | Impact energy (Joules) | Autonomy (min) |
| UAS 1 |  |  |  |  |  |  |  |  |
| UAS 2 |  |  |  |  |  |  |  |  |
| UAS n |  |  |  |  |  |  |  |  |

\*The technical data of the UAS are provided by the different manufacturers in the aircraft documentation. A list of manufacturers and aircraft with the most relevant technical data, including impact energy, is also available on the [AESA website](https://www.seguridadaerea.gob.es/sites/default/files/Listado_Fabricantes.pdf).

* 1. Semantic model

The semantic model is described according to the type of UAS indicated in the previous section. The data shown are maximum values for flight geography and minimum values for contingency volumes and safety buffers to be met by the operator in each of its flights. In calculating these distances, in addition to the type of UAS and its performance, weather constraints, flight profiles, contingency and emergency protocols, and remote pilot response times, etc., have been considered.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Maximum flight geography(distances in metres) | Minimum contingency volume(distances in metres) | Minimum air risk buffer(distances in metres) | Comments(\*\*) |
| Horizontal\* | Vertical | Horizontal | Vertical | Horizontal | Vertical |
| UAS 1 |  | 60 |  |  |  |  |  |
| UAS 2 |  | 60 |  |  |  |  |  |
| UAS n |  | 60 |  |  |  |  |  |

(\*) It represents the pilot – UAS distance, radius of the volume.

(\*\*) The horizontal distance of the flight area will be reduced to 100 m in urban environments.

# SPECIFIC MITIGATION MEASURES FOR CONTROLLED AIRSPACE OPERATIONS

UAS operations conducted in controlled airspace must meet the requirements established in Chapter XI of Royal Decree 1180/2018 and with the measures determined by the ATSP for this type of operation in order to guarantee the safety and continuity of air operations.

|  |  |  |  |
| --- | --- | --- | --- |
| **COD.** | **TYPE OF MITIGATION** | **MITIGATION MEASURE** | **OBSERVATIONS** |
|
| MAE01 | Strategic | Have the knowledge required to obtain a **radio operator rating** endorsed by a pilot licence or certification issued by an approved training organisation (ATO) or ultralight aircraft school.  | Article 33.1.e RD 1036/2017 |
| MAE02 | Strategic | Demonstrate an **adequate knowledge of the language** or languages used in communications between the controller and the aircraft, considering the operational conditions of the airspace in which the operation is carried out | Article 33.1.e RD 1036/2017 |
| MAE03 | Strategic | Have adequate **communications equipment** capable of sustaining two-way communications with aeronautical stations and on the frequencies indicated to meet the requirements applicable to the airspace in which it operates. | Article 46.1.a RD 1180/2018 |
| MAE05 | Strategic | Have an aeronautical safety study conducted for this purpose by the operator and coordinated with the designated air traffic service provider in the airspace concerned, confirming the safety of the operation. The operation shall be conducted subject to the conditions and limitations set out in said aeronautical safety study | This documentArticle 45.3.c RD 1180/2018 |
| MAE07 | Strategic | Submit a flight plan for air traffic services (FPL). The flight plan shall explicitly state that it is an unmanned aircraft. | Article 45.5 RD 1180/2018 |
| MAE09 | Strategic | Coordination with the aerodrome operator, including heliports, if it is intended to operate at a distance of less than 8 km from the reference point of any airport or aerodrome and the same distance from the runway centrelines and their extension, at both runway headings, to a distance of 6 km from the runway threshold in the direction away from the runway. | Article 45.3.b RD 1180/2018 |
| MAE04 | Strategic | Have an alternative communication system with the ATS unit (**mobile phone**). |  |
| MAE11 | Strategic | Operational restriction on exposure time (use as little time as possible). |  |
| MAE12 | Strategic | Prior coordination, in the assessment and mitigation of operational risk, of ARCID code and call identifier (callsign) to be used in operations. |  |
| MAE13 | Strategic | Prior coordination, in operational risk assessment and mitigation, of the language(s) to be used in aeronautical communications between the operator and the air traffic service.  |  |
| MAE15 | Strategic | Operational constraint and definition of the operating volume reinforced by geocaging/geofencing/software, necessarily at AGL height and, whenever possible, protected from obstacles or orography. |  |
| MAE27 | Strategic | Have procedures for checking activities and warnings to airspace users (NOTAMs) in the envisaged area of operations. |  |
| MAE30 | Strategic | Adequate planning of the operation to maintain situational awareness. In the event that the pilot has "no visual of the surroundings" or is flying 15 m above the highest obstacle within 50 m of the UAS, he/she shall use airspace observers and/or other means (aeronautical radio) to avoid a chance encounter with a manned aircraft. |  |
| MAE34 | Strategic | Have lights to ensure visibility when operating at night. | Article 46.1.e RD 1180/2018 |
| MAT01 | Tactic | Verification of activities and warnings for airspace users (NOTAM, etc.) in the area where UAS operations will take place. In this regard, the ENAIRE DRONES application, at least, shall be used. |  |
| MAT04 | Tactic | Be actively listening on the appropriate aeronautical frequency or, failing that, be able to communicate by mobile telephony system (adequate sound volume and with coverage). |  |
| MAT05 | Tactic | Contact the HTM unit with the advance notice indicated by the ATSP according to the coordination procedure to verify the feasibility of the operation. |  |
| MAT06 | Tactic | Have **prior air traffic control clearance or communication to aerodrome flight information staff** (AFIS). On first contact with air traffic service units, the callsigns of unmanned aircraft shall include the word "Unmanned". | Article 45.3.c RD 1180/2018 |
| MAT08 | Tactic | Communicate the termination of the operation to the air traffic services (ATS) unit. |  |
| MAT09 | Tactic | The availability and implementation by the UAS operator of specific procedures for abnormal and emergency situations, whose main measure is radio/telephone notification to the ATS unit in the event of loss of control of the UAS (fly-away). |  |
| MAT10 | Tactic | Prior analysis of VHF coverage in the planned area of operations, as well as telephone network coverage in the event of using this medium either as the primary communications system or as an alternative if the primary medium fails. Prior to commencing the operation, it must be possible to perform a radio and/or call test, the suitability of which shall be at the discretion of the ATS unit. | Verify that mobile phone coverage is available at the operation site. |
| MAT20 | Tactic | Immediate landing by communication from the ATC service or traffic information from AFIS. |  |

# PROCEDURE FOR THE OPERATIONS COORDINATION WITH ATSP

The agreed-upon instructions to be followed to carry out each of the intended air operations by the UAS operator in controlled airspace are shown below:

|  |  |
| --- | --- |
| ARCID callsign\* | AEDRON# |
| Callsign\* | AERODRON ## |
| Language to be used in aeronautical communications | SPANISH / ENGLISH |
| Primary means of communications | MOBILE TELEPHONE |
| Alternative means of communications | AERONAUTICAL RADIO |
| NOTAM publication request | NO\*\* |

\*Notwithstanding that this may be modified during the tactical coordination or by the ATCO/AFISO during the operations based on its authority.

\*\*Nevertheless, this may be required during the tactical coordination if considered convenient.

Procedure to be followed by the UAS operator to conduct any flight according to the coordinated CONOPS:

Flowchart of specific operations to EARO-A prepared by the ATSP detailing the instructions, in chronological order, to be followed by the UAS operator to carry out a specific operation.

1. If coordination with the aerodrome manager is required according to mitigation measure MAE09, the airport manager shall be contacted at least 20 business days before the operation.
2. Minimum of **10 business days** before the operation submit to the ATSP:
	* Copy of evidence of EARO coordination (this document) signed by both parties.
	* Operation-specific data
		+ Specific place.
		+ Date and time.
3. The day before the operation (recommended) or up to 60 minutes before the start time of the operation, submit a flight plan for air traffic services (FPL) according to the ENAIRE guide available on its website.

(<https://www.enaire.es/servicios/drones/lo_necesario_para_volar_tu_dron/volar_espacio_aereo_controlado_enaire>)

1. Before the flight:
	* Check that the ATS flight plan has been correctly submitted.
	* Pre-flight Information Bulletin (PIB) and/or NOTAM and weather in the area of operations.
2. 30 minutes before the start of operations: contact the ATC/AFIS to confirm the operation.
	* In the first communication, the pilot shall report the reference number of the aerial work concerned (REF. ENAIRE XXX / Callsign XXX), including the word “UNMANNED” in the communication.
3. Before the start of the flight: contact the ATCO/AFISO to obtain flight authorisation (take-off) or report it.
4. After completing the operations:
	* contact the ATCO/AFISO and report the termination of the operations.
	* notify the closure of the ATS flight plan by calling the corresponding ARO office.
	* notify the COOP of the termination and/or cancellation of operations.

# ABNORMAL AND EMERGENCY SITUATIONS specific procedure

The UAS operator shall adopt the following procedures for abnormal and emergency situations:

|  |  |
| --- | --- |
| EVENT | PROCEDURE |
| Loss of communications between UAS operator and ATSP | * If the communications failure is detected by the ATS unit:

- Establish communication by alternative means (landline or mobile phone or aeronautical communications radio) informing of the loss of communication. If proper communication between the ATS unit and the UAS operator cannot be guaranteed, the operations shall be cancelled.* If the communications failure is detected by the UAS operator:

- Maintain situational awareness by monitoring the airspace and "seeing and avoiding".- Establish communication by alternative means (landline or mobile phone or aeronautical communications radio) informing of the initial communications failure and proceed according to the ATS's instructions or communications.- If the operator is unable to establish communication by any means, he/she shall immediately terminate the flight by landing the aircraft in a safe place.- Communicate the termination of the activity to the ATS unit as soon as possible by the relevant alternative means and cancelling the ATS flight plan.- In the event of re-establishment of communications, the UAS operator shall newly obtain ATC clearance or AFIS communication to commence a new flight. |
| Loss of control of the UAS (fly-away) | If control cannot be regained and/or the position of the UAS is unknown:- Consider activating the safe flight termination system according to the operator's procedures.- Notify the ATS of the loss of control and position of the UA by radio/telephone as soon as possible:- Callsign + "unmanned"- Emergency due to loss of control of the unmanned aircraft- Last known position, speed, course and height/altitude- Remaining autonomy- Report the termination of the emergency to the ATS when it is known that the UA is no longer in flight or it is certain that no further flight is possible (the maximum total UA autonomy time has elapsed) |

The contact addresses for notifications in case of abnormal or emergency situations are shown below:

|  |  |
| --- | --- |
| Position | Contact |
| ATS Unit (civil/military) | Frequency / TLF // According to the unit affected. Provided during prior coordination |
| ENAIRE Airspace Operational Coordination Department (COP) | ENAIRE PLANEA / cop@enaire.es |
| Airport Management Centre (AMC) / Airport Operations / Military Base | Depending on the affected unit. The Contact is provided during prior coordination. |
| Emergencies | 112 |

# COORDINATION EVIDENCE AND VALIDITY

This coordination is valid indefinitely, subject, in any case, to the proper implementation of the mitigation measures and compliance with the established limitations or conditions of the operation and as long as compliance is maintained. Any modification or deviation from the contents of this document will require a new agreement. Where justified reasons exist, ATSP reserves the right to modify these terms and conditions or to revoke the agreement.

As proof of conformity and evidence of coordination, both parties’ consent to the present document:

|  |  |
| --- | --- |
| **The operator** | **The air traffic service provider** |
| In XXX, on 09 April 2024 | In Madrid, on \_\_\_ \_\_\_\_\_\_\_\_\_\_\_2024 |
| Signed | Signature/seal |
| Position | ENAIRE Safety Technical |
| NAME AND SURNAMES |

# APPENDIX I. SAFETY DISTANCES WITH RESPECT TO AERODROMES

This risk assessment and coordination of operations shall be valid whenever the flight geography **and its associated contingency volume** according to the semantic model described above fall **outside the aerodrome safety distances** defined below:

a) At public and military airfields other than heliports:

1) Up to 45 metres in height measured from the Aerodrome Reference Point, hereinafter ARP: an area of 6 kilometres in length measured from the ends of the runway in the direction of the outward extension of the runway centreline and a width of 5 kilometres on both sides measured from the runway centreline. In all cases, the lower limit of this volume shall be the surface level.

2) More than 45 metres in height and up to 900 metres in height, both measured from the ARP: an area of 10 kilometres in length measured from the ends of the runway in the direction of the outward extension of the runway centreline and a width of 7.5 kilometres on both sides measured from the runway centreline.



b) At public and military heliports:

1) Up to 90 metres in height measured from the Heliport Reference Point (hereinafter, "HRP"): an area of 2.5 kilometres in length measured from the ends of the Final Approach and Take-Off Area (FATO) in the direction of the outward extension of the FATO centreline and a width of 2.5 kilometres on both sides measured from the FATO centreline. In all cases, the lower limit of this volume shall be the surface level.

2) More than 90 metres in height and up to 900 metres in height, both measured from the HRP: an area of 3.3 kilometres in length measured from the FATO in the direction of the outward extension of the runway centreline and a width of 3.3 kilometres on both sides measured from the FATO centreline.



a) At restricted aerodromes other than heliports:

1) Up to 45 metres in height measured from the ARP: an area of 3 kilometres in length measured from the ends of the runway in the direction of the outward extension of the runway centreline and a width of 3 kilometres on both sides measured from the runway centreline. In all cases, the lower limit of this volume shall be the surface level.

2) More than 45 metres in height and up to 900 metres in height, both measured from the ARP: an area of 5 kilometres in length measured from the ends of the runway in the direction of the outward extension of the runway centreline and a width of 4.5 kilometres on both sides measured from the runway centreline.



d) At restricted heliports:

1) Up to 90 metres in height measured from the HRP: a circular area with a radius of 2.5 kilometres from the centre of the FATO. In the case of restricted heliports with runway type FATOs longer than 100 metres in length, the above distance shall be considered as measured from each end of the FATO. In all cases, the lower limit of this volume shall be the surface level.

2) More than 90 metres in height and up to 450 metres in height, both measured from the HRP: a circular area with a radius of 3.3 kilometres from the centre of the FATO. In the case of restricted heliports with runway type FATOs longer than 100 metres in length, the above distance shall be considered as measured from each end of the FATO.



**IMPORTANT:** Pursuant to Article 45.3.b of Royal Decree 1180/2018, if the operation is located at a minimum distance of less than 8 km from the reference point of any airport or aerodrome and the same distance from the runway centrelines and their extension, at both runway headings, up to a distance of 6 km from the threshold in an outward direction from the runway, the operation shall be coordinated with the aerodrome manager.

# APPENDIX II. ACRONYMS

|  |  |
| --- | --- |
| AESA | State Aviation Safety Agency |
| AIP | Aeronautical Information Publication |
| ANSP | Air Navigation Services Provider |
| ATSP | Air Traffic Services Provider |
| ATS | Air Traffic Services |
| ATC | Air Traffic Control |
| ATZ | Air Traffic Zone |
| AFIS | Aerodrome Flight Information Services |
| ATCO | Air Traffic Control Officer |
| AFISO | Aerodrome Flight Information Services Officer |
| BVLOS | Beyond Visual Line of Sight |
| COP | ENAIRE Airspace Operational Coordination Department |
| CTA | Control Traffic Area |
| CTR | Controlled Traffic Region |
| EMA | Spanish Air Force |
| FPL | Flight Plan |
| MTOM | Maximum Take-Off Mass |
| NOTAM | Notice containing essential information relating to the establishment, condition or modification of any aeronautical facility, service, procedure or hazard that must be known in a timely manner by personnel conducting flight operations (NOTICE to AirMen) |
| PIB | Pre-flight Information Bulletins |
| STS | Standard Scenario |
| TRA | Temporary Reserved Area |
| TSA | Temporary Segregated Area |
| UA | Unmanned Aircraft |
| UAS | Unmanned Aircraft System |
| VLOS | Visual Line of Sight |

1. Safety distances to aerodromes for the purpose of risk assessment and coordination of UAS operations in controlled airspace, as per the appendix to this document. These distances are independent of the requirement of coordination of operations with the infrastructure manager established in Article 45.3.b of Royal Decree 1180/2018. [↑](#footnote-ref-2)
2. UAS as defined in Art. 20 of SR (EU) 2019/947, i.e. that have been placed on the market before January 1, 2024 and are neither privately built nor have class marking, shall be considered as "legacy drones". [↑](#footnote-ref-3)
3. UAS as defined in Art. 20 of SR (EU) 2019/947, i.e. that have been placed on the market before January 1, 2024 and are neither privately built nor have class marking, shall be considered as "legacy drones". [↑](#footnote-ref-4)