

# RPAS Passport

Applicable to [RPAS type] [version]  
from [RPAS Contractor]

Version 1.0

Date: [dd.mm.yyyy]

## Document History

Version	Date	Changes	Prepared	Approved
1.0	dd/mm/yyyy	Initial version	[RPAS contractor Designated person]	[EMSA Designated person]

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## List of Symbols and Abbreviations

Symbols or Abbreviation	Designation
AD	Applicable Document
AoI	Area of Interest
ATC	Air Traffic Control
CG	Center of Gravity
CGCS	Central Ground Control Station
EMSA	European Maritime Safety Agency
EU	European Union
FCS	Flight Control System
FH	Flight Hours
FWC	Framework Contract
GAE	Ground Auxiliary Equipment
GCS	Ground Control Station
GDT	Ground Data Terminal
HRM	Holistic Risk Model
Id	Identification
IPC	Illustrated Parts Catalogue
MS	Member State
NAA	National Aviation Authorities
OM	Operations Manual
PL	Payload
P/N	Part Number
QA	Quality Assurance
RD	Reference Document
ROC	Rate of Climb
RPAS	Remoted Piloted Aircraft System
SEP	Specific excess power
SORA	Specific Operation Risk Assessment
TRA	Temporary Reserved Area
Vs	Stall Velocity

## List of Appendix

Appendix A.	Previous permits to fly or certificates
Appendix B.	Flight hours
Appendix C.	RPAS operation authorised personnel certificates
Appendix D.	RPAS technical logbook
Appendix E.	Liability insurance for the operations

# 1. Introduction to the document

## 1.1 Purpose

This document intends to gather RPAS [RPAS type] [version] relevant information required for its operation as part of EMSA RPAS services.

Despite each country will apply its own RPAS regulation, this document compiles, in one set, the minimum information that will be required by the Member State, where the deployment will take place, to obtain the permit to fly.

RPAS documentation constitutes one of the key deliverables of the Framework Contract for Services [EMSA/OP/XX/20XX], so this document shall be filled by the awarded RPAS contractor in accordance to the instructions described below.

As stated in the tender specification to contract no. [EMSA/OP/XX/20XX], the RPAS service provider (contractor) is obliged to provide all documentation necessary in a timely manner and to support the process of receiving flight approval.

The RPAS contractor will update this document, and the document history table, when needed: in case RPAS configuration is modified or in case further information is required by EMSA.

## 1.2 Filling instructions

This document is considered as a template to be filled by the RPAS contractor. Fields marked in [yellow] require to be completed in accordance to the provided instructions.

Information could be provided in two ways:

- Required information appearing directly in this document. Table, figures and diagrams may be needed. In some sections, maximum extend is indicated.
- Required information contained in other document. In this case, a clear reference to the mentioned shall be indicated and included in the reference documents table. This reference shall contain: identification of the document (last version) and section where to find the information.
  - As an example:
    - *Emergency procedures: please refer to [RD.3] RPAS Flight Manual, chapter 6.*

EMSA has to approve this document and the updates, before it can be forwarded to national aviation authorities or to EASA.

### 1.3 Contents

This document contains information related to:

- RPAS system description, architecture and performances;
- RPAS operation and maintenance procedures;
- RPAS flight manual;
- RPAS on-site requirements;
- RPAS technical logbook;
- RPAS operational risk assessment and mitigation plan;
- RPAS safety case;
- RPAS service quality assurance plan;
- Previous RPAS permit to fly;
- RPAS flight hours;
- Training and qualification of the RPAS crew.
- Liability insurance for the operations.
- Configuration Management

### 1.4 Applicable documents

Id	Document number	Document name	Date
[AD1.]	Invitation to Tender no [EMSA/OP/XX/20XX]	[Invitation to Tender name]	[dd.mm.yyyy]
[AD2.]	[EMSA/OP/XX/20XX] Tender Enclosure I	[Tender enclosure I– Technical specifications attached to the invitation to tender name]	[dd.mm.yyyy]
[AD3.]	Framework Contract for Services no [EMSA/OP/XX/20XX]	[Framework Contract for Services name]	[dd.mm.yyyy]
[AD4.]		[add others in case it is needed]	

### 1.5 Reference documents

Id	Document number	Document name	Version	Date
[RD1.]	[document number]	[RPAS description]	[vx.x]	[dd.mm.yyyy]
[RD2.]	[document number]	[RPAS configuration]	[vx.x]	[dd.mm.yyyy]
[RD3.]	[document number]	[RPAS Flight Manual]	[vx.x]	[dd.mm.yyyy]
[RD4.]	[document number]	[RPAS Operation Manual]	[vx.x]	[dd.mm.yyyy]
[RD5.]	[document number]	[RPAS Maintenance Manual]	[vx.x]	[dd.mm.yyyy]
[RD6.]	[document number]	[RPAS operational risk assessment and mitigation plan]	[vx.x]	[dd.mm.yyyy]
[RD7.]	[document number]	[RPAS On-site requirement]	[vx.x]	[dd.mm.yyyy]



		[add other referenced documents]		
--	--	----------------------------------	--	--

Reference documents shall be enclosed to this document.

## 2. RPAS contractor overview

This chapter aims to present an overview of the service provider [RPAS contractor's name]. This section describes [RPAS contractor] organisation to support safe operations, including:

- Structure of organization and management
- Responsibilities and duties of the RPAS contractor.

It is also described:

- How safety management is integrated in the organisation.
- If the organisation is responsible of the design and/ or production of the RPAS.

[Insert a brief description of the RPAS contractor company/ consortium:

- Background (mainly related to RPAS)
- mission and objectives
- in case of a consortium, strengths and roles of the partners
- ISO certifications
- Information listed above about: structure and organisation, responsibilities, safety management, and design/ production

Maximum extent of 2 pages]

### 3. RPAS description

This section gathers a general overview and description of the [RPAS type] [version].

[Include the reference document and section where this information is contained for the RPAS subject of this document. At least information about topics listed below shall be described in the mentioned document]

[Insert a brief description of the RPAS subject of this document:

- Global system architecture, main subsystems
- Add an illustration representing the global system architecture
- Maximum extent of 2 pages.]

- [figure]

Figure 1 Global system architecture

#### 3.1 RPAS general specifications

[Add a picture of the RPAS platform and of the GCS as an option]

[figure]

Figure 2 [RPAS type] [version] picture

Table 1 [RPAS type] [version] general specifications

[RPAS type] [Version] general specifications	
Physical characteristics	
[name of the characteristic]	[value] [units]
[Wing span/ rotor diameter]	
Length	
Height	
Materials	
[main material #1]	[metal alloy/ composite]
[main material #2]	[metal alloy/ composite]
Weights	
MTOW	
Empty weight	
Maximum fuel capacity	
Payload capacity [indicate PL sensors]	
Propulsion system	
Engine type	
Fuel consumption	
Fuel type	

Performances <sup>1</sup>		
Nominal cruise speed		
Maximum speed		
Stall speed		
Maximum altitude		
Range	RLOS	
	BRLOS	
Endurance [indicate PL configuration]		
Maximum rate of climb		
Maximum rate of descent		
Maximum bank angle		
Turn rate limits		
[add/ change according to the RPAS]		
Operational conditions		
Daytime		
Maximum head wind/ cross wing / gusts	Take- off/ landing	
	During flight	
Rain		
Ice		
Minimum visibility conditions		
Communications		
Flight modes		
Take-off and landing		[specify: runway or if a catapult/ net/ hook/ other are needed]
Take- off distance		
Landing distance		

[Add 3 view illustration of the RPAS platform]

[figure]

Figure 3 [RPAS type] [version] 3 view

<sup>1</sup> Detailed performances are included in "Flight Manual", chapter 6.



Table 2 [RPAS type] [version] Payload specifications

Payloads	
<b>[Payload#1]</b>	
[Relevant characteristics]	
[Relevant characteristics]	
[Relevant characteristics]	
<b>[Payload#2]</b>	
[Relevant characteristics]	
[Relevant characteristics]	
[Relevant characteristics]	
<b>[Payload#3]</b>	
[Relevant characteristics]	
[Relevant characteristics]	
[Relevant characteristics]	
<b>[Payload#4]</b>	
[Relevant characteristics]	
[Relevant characteristics]	
[Relevant characteristics]	
<b>[Payload#5]</b>	
[Relevant characteristics]	
[Relevant characteristics]	
[Relevant characteristics]	

## 3.2 Operational capabilities

This section describes the operational capabilities of the RPAS services provided by [RPAS contractor] and valid for the given configuration (see RPAS configuration section, chapter 4) of the [RPAS type] [version].

[The capabilities described are based on the RPAS service status as demonstrated during the system capability test.]

## 3.3 System architecture

[Insert a brief description of the composition of the system associated to the service to be provided: RPAS platform and subsystems, payload, ground control station(s), communications, launch and recovery systems (if necessary), auxiliary equipment. Maximum extent of 1 page]

[Add an illustration/tree of Product Breakdown Structure- high level]

[figure]

Figure 4 [RPAS type] [version] Product breakdown structure

## 3.4 RPAS platform and subsystems

[Insert a brief description of the RPAS platform and subsystems (sensors, actuators, harness, avionics, power plant, fuel system etc.). Addition of pictures will be appreciated. Maximum extent of 2 pages]

### 3.4.1 RPAS Airframe and sub- systems

[Insert a brief description of the RPAS airframe and sub- systems. Addition of pictures will be appreciated. Maximum extent of 2 pages]

### 3.4.2 RPAS payload

[Insert a brief description of the RPAS payload. Addition of pictures will be appreciated. Maximum extent of 2 pages]

## 3.5 Ground Control Stations (GCS)

[Insert a brief description of the ground control station(s) necessary for the RPAS service and detail the tasks they are devoted to. Addition of pictures will be appreciated. Maximum extent of 2 pages]

## 3.6 Ground Data Terminal (GDT)

[Insert a description of the ground data terminal (antennas, masts) needed for the RPAS communication, including communications between the RPA and the GCS and communications between the GCS and the Central Ground Control Station. This description could be merged with GCS depending on the system. Addition of pictures will be appreciated. Maximum extent of 1 page]

### 3.7 Ground Auxiliary Equipment (GAE)

[Insert a description of the ground subsystems considered absolutely necessary for the RPAS operation: launcher, recovery net, recovery hook, arresting cable, etc. Addition of pictures will be appreciated. Maximum extent of 1 page]

### 3.8 RPAS communication infrastructure

This section details the communication sub-system architecture as well as information on data flow and sub-system performances, including values for data rates and latencies if known. Data link connecting the RPAS and the GCS is described.

[Insert a brief description of the RPAS communication infrastructure. At least following information shall be provided:

- RLOS and BRLOS if applicable.
- Main and backup (redundant) communication channels.
- List the devices/systems used and include main specifications (transceiver, antenna, amplifier...), on the RPAS platform and on the ground.
- Include communication from the RPA to the ground segment and from there to the users and EMSA.
- Indicate if what the design characteristics or procedures are in place to mitigate the loss of the data link
- Indicate if there is a signal strength and/or health indicator display available for the RPAS operator
- Addition of block diagram will be appreciated. Maximum extent 2 pages.]

Table 3 [RPAS type] [version] communication system specifications

System Specification	SI Units	Description	Value
[Device/System#1]			
[Relevant characteristics]			
[Relevant characteristics]			
[Relevant characteristics]			
[Device/System#2]			
[Relevant characteristics]			
[Relevant characteristics]			
[Device/System#3]			
[Relevant characteristics]			
[Relevant characteristics]			

Table 4 [RPAS type] [version] GCS communication system specifications

System Specification	SI Units	Description	Value
[Device/System#1]			
[Relevant characteristics]			
[Relevant characteristics]			
[Relevant characteristics]			
[Device/System#2]			
[Relevant characteristics]			
[Relevant characteristics]			
[Device/System#3]			
[Relevant characteristics]			
[Relevant characteristics]			
[Relevant characteristics]			

## 3.9 System frequency usage

### 3.9.1.1 Frequency bands selection and authorization

[Insert a brief description of the frequency bands selected for the BRLOS and RLOS. Main and backup (redundancy) channels]

Table 5 [RPAS type] [version] Frequency usage

Devoted to	Frequency range	Power	Bandwidth	Remarks
RLOS main				
RLOS redundancy				
BRLOS main				
BRLOS redundancy				

### 3.9.1.2 Sources of radiating radio frequency

[Insert a brief description of the radio spectrum (frequency) required for the services, and the sources of radiating radio frequency within the RPAS]

Table 6 [RPAS type] [version] Payload data channel specifications: BRLOS and RLOS

	Specification	SI Units	Description	Value
BRLOS	Type			
	Service			
	Network mode			
	Frequencies			
	Coverage			
	Bandwidth			
	Modulation			
	Data rate			
	Security			
	Latency			
	[Other relevant specifications]			
RLOS	Type			
	Service			
	Network mode			
	Frequencies			
	Coverage			
	Bandwidth			
	Modulation			
	Data rate			
	Security			
	Latency			
	[Other relevant specifications]			

## 3.10 Data provision and integration in data streams

[Insert a brief description of the data presentation for the provision of services. Describe in detail which communication technology is used to transmit in the shortest possible time all collected data to the systems run by EMSA (EMSA RPAS Data Center) and further distributed to the final users of the services, including:

- satellite network,
- network mode,
- frequency,
- guaranteed bandwidth,
- area of coverage,
- latency time.

This has to be provided for RLOS and BRLOS communication channels. Also, describe how the acquired data will be integrated with marine and meteorological information (which external data will be used), stored and visualised by the user. Maximum extent 2 pages]

## 4. RPAS configuration

This section contains [RPAS type] [version] configuration description. It includes the product structure description of the RPAS platform, RPAS GCS and RPAS GDT (if applicable).

Main systems and their components are listed in a tree diagram.

Additionally, tables are presented containing the name of the component, P/N and quantity. Software version is also included when applicable. Tables present the assembly structure formed by parts and subassemblies.

Illustrated parts catalogue is also included. [not mandatory but desirable]

[Include the reference document and section where this information is contained for the RPAS subject of this document. At least information about topics listed below shall be described in the mentioned document]

### 4.1 RPAS configuration tree diagram

[Add a tree diagram of RPAS platform product]

[figure]

Figure 5 [RPAS type] [version] product tree

[Add a tree diagram of RPAS GCS product]

[figure]

Figure 6 [RPAS type] [version] GCS product tree

[Add a tree diagram of RPAS GDT product]

[figure]

Figure 7 [RPAS type] [version] GDT product tree

## 4.2 RPAS configuration tables

Table 7 [RPAS type] [version] configuration table

Component name	P/N	Quantity	Software version	Remarks
[include component name]	[include P/N]	[include the quantity]	[sw version when applicable]	[relevant remarks]
[note: structure the table with parts and subassemblies]				

Table 8 [RPAS type] [version] GCS configuration table

Component name	P/N	Quantity	Software version	Remarks
[include component name]	[include P/N]	[include the quantity]	[sw version when applicable]	[relevant remarks]
[note: structure the table with parts and subassemblies]				

## 4.3 RPAS IPC

[Include reference to the RPAS IPC document if available]

## 4.4 RPAS configuration management plan

[Include the reference document where this information is contained for the RPAS subject of this document. Software management control shall be also explained. Also mentioned in the QA plan section]



## 5. Operations Manual

This chapter aims to provide instructions to the RPAS operational crew on how to safely operate the [RPAS type] [version]. It contains requirements that are mandatory to follow and offers guidance on relevant topics, including actions to be undertaken before, during and after the flight.

The main purpose of the Operations Manual (OM) is to describe and document how RPAS services operations are executed, describe roles and responsibilities of the RPAS crew as well as the training requirements and indicate equipment needs.

[Include the reference document where this information is contained for the RPAS subject of this document. At least information about topics listed below shall be described in the mentioned document]

### 5.1 Safety

[Include the reference document and section where this information is contained for the RPAS subject of this document. At least information about topics listed below shall be described in the mentioned document]

- 5.1.1 General safety concerns
- 5.1.2 Warnings
- 5.1.3 Cautions
- 5.1.4 Hazards

[Insert a list/description of hazards during the RPAS operation, as noise, chemical, radiation or electrical hazards. Special consideration about power plant and batteries]

#### 5.1.5 Danger zones

[Include figures indicating the RPAS operation on ground danger zones, as an example, those related to the propeller or to the launcher]

## 5.2 RPAS Operation general description

Operations are arranged based on a weekly flight schedule, prepared typically at least one week in advance. After the conclusion of the missions of the week, a weekly flight report will gather the actual flights flown. RPAS Operating procedures either in the coordination document or made reference to the coordination document, for each deployment, will describe these aspects and other details required for the operational coordination.

[Insert a list of tasks and a schedule on a weekly basis for the user. Describe the maximum number of flights per day/night, including RPAS crew involved and time needed. Maximum extent ½ page]

### 5.2.1 Mission phases

[RPAS type] mission phases are [List the sequence of mission phases, from the moment a mission is scheduled till the mission is concluded. These phases will typically include, for each RPAS mission/ flight:

- Flight plan preparation;
- Pre-flight activities;
- Mission execution;
- Post flight activities;

Notice that these phases will be further described in the Operation Manual chapter]

The table below summarises these phases:

Table 9 [RPAS type] [version] mission phases

Phase	Description	Responsible
Flight plan preparation		
Pre-flight activities		
Mission execution		
Post flight activities		
		[add columns/ rows if needed]

[Insert a description of the operation phases above, or insert a reference document and section where to find this information]

### 5.2.2 Flight plan preparation

[Insert a description of the flight preparation stage, including main activities, who is responsible and relevant factors to be considered, as TRA or weather forecast. Maximum extent ¼ page]

### 5.2.3 Pre-flight activities

[Insert a description of the pre- flight stage, including main activities, who is responsible and relevant factors to be considered. This stage typically includes activities as: preparation of the RPAS for the flight and pre-flight checks, crew briefing, communications check, safety checks and cordon procedure, Maximum extent 1/2 page]

### 5.2.4 Mission execution

[Insert a description of the flight stage, including main activities, who is responsible and relevant factors to be considered. This stage typically includes activities as: initiation of the RPAS, taxi automatic take-off, climb, transition to the AoI, mission (RLOS and BRLOS if applicable), approach, automatic landing and RPAS shutdown. Emergencies procedures will be described in the Flight Manual. Maximum extent ½ page]

### 5.2.5 Post-flight activities

[Insert a description of the post- flight stage, including main activities, who is responsible and relevant factors to be considered. This stage typically includes activities as: mission analysis, de- briefing, flight report, RPAS post flight maintenance procedures and RPAS storage or ready for new mission. Maximum extent ¼ page]

### 5.3 Responsibilities and duties of personnel

This section includes a description of the responsibilities and duties of the RPAS operational crew. Information about the topics listed below is included:

- List of the staff needed in each phase of the RPAS operation. Typically RPAS crew for operations at least counts with following roles:
  - RPAS Mission commander/ chief.
  - RPAS Pilot.
  - RPAS Payload operator.
  - RPAS Safety Pilot.
  - RPAS Technician.
  - Other RPAS ground crew.
- For each role, include:
  - Brief description of the role and associated responsibilities.
  - Minimum number of required people for each role for the operation, in order to accomplish with the service provision (having into account shifts).
  - Training, qualifications and certificates required for each role. These certificates are included as an appendix at the end of the document for the current [RPAS contractor] authorised personnel.

This section will be updated when required; in case expiration, renovation or addition of certificates.

[Include the reference document where this information is contained for the RPAS subject of this document]

### 5.4 Training and certificates programs

This chapter describes the certification required, the initial and recurrent training and the organisational systems used to develop and maintain the proficiency needed for the range of operations (including day/night and RLOS/BRLOS operations) regarding the RPAS service provided by [RPAS contractor] with the [RPAS type] [version].

#### 5.4.1 Training general information

This section describes the processes and procedures that [RPAS contractor] uses to develop and maintain the necessary competence for all staff involved in [RPAS type] [version] operations.

[Include the reference document where this information is contained for the RPAS subject of this document]

#### 5.4.2 Certificates and associated training programs

Table 10 [RPAS type] [version] certificates and training program table

Certification	Training program	Reference
[Certification required- linked to the roles described above]	[Description of the main contents of the training program to qualify RPAS crew or reference to the training program document. This document shall include required refresher trainings]	[Actual certificates of RPAS operational crew, to be included as an appendix]

### 5.4.3 Up-keeping RPAS crew expertise

This section also describes the routines for proficiency up-keeping and maintenance of RPAS crew certificates and expertise. It is also included Flight Simulation Training Devices for acquiring and maintaining the practical skills [in case applicable].

[Include a description of the RPAS contractor's quality control system in place to maintain the RPAS crew necessary expertise to provide the service]

## 5.5 Operational instructions

This section gather the [RPAS type] [version] operational instructions. Further details about RPAS nominal and emergency flight procedures are included in the Flight Manual, chapter 6.

### 5.5.1 Flight preparation

[Include the reference document and section where this information is contained for the RPAS subject of this document. At least information about topics listed below shall be described in the mentioned document]

- 5.5.1.1 Flight plan
- 5.5.1.2 Meteorological verification
- 5.5.1.3 Safety checks
- 5.5.1.4 Briefing
- 5.5.1.5 Weight and balance
- 5.5.1.6 Pre-flight procedures

### 5.5.2 Flight

- 5.5.2.1 Ground manoeuvring
- 5.5.2.2 Automatic Take-off
- 5.5.2.3 Climb and transition to the AoI
- 5.5.2.4 Mission execution
- 5.5.2.5 Approach and automatic landing

### 5.5.3 Post- flight

- 5.5.3.1 De- briefing
- 5.5.3.2 Post- flight procedures

## 5.6 Weight and balance

[Include the reference document and section where this information is contained for the RPAS subject of this document. At least information about topics listed below shall be described in the mentioned document]

- 5.6.1.1 Weight and balance procedure
- 5.6.1.2 CG limits and weigh instructions

## 6. RPAS flight manual

### 6.1 Flight limits

This section describes [RPAS type] [version] flight limits.

[Include the reference document and section where this information is contained for the RPAS subject of this document. At least information about topics listed below shall be described in the mentioned document]

The table below summarises these limits.

Table 11 [RPAS type] [version] flight limits

[RPAS type] [Version] flight limits		
Meteorological limits		
Temperature		[value] [units]
Rain		[value] [units]
Ice		[value] [units]
Maximum head wind/ cross wing / gusts	Take- off/ landing	[value] [units]
	During flight	[value] [units]
Minimum visibility conditions		[value] [units]
Flight envelope		
Altitude		[value] [units]
Maximum speed		[value] [units]
Stall speed		[value] [units]
Turn radio		[value] [units]
Load factor		[value] [units]
Range		[value] [units]
Engine limits		
Maximum power		[value] [units]
Altitude		[value] [units]
Weight and balance limits		
MTOW		[value] [units]
CG		[value] [units]

## 6.1.1 Meteorological limits

- 6.1.1.1 Temperature
- 6.1.1.2 Rain
- 6.1.1.3 Ice (if have de-icing)
- 6.1.1.4 Wind

- 6.1.1.4.1 Maximum cross wind for take off and landing
- 6.1.1.4.2 Maximum operational wind

[Include the reference document and section where this information is contained. Relative wind speed envelope shall be included]

[Add relative wind speed envelope of RPAS platform product]

[figure]

Figure 8 [RPAS type] [version] relative wind speed envelope

- 6.1.1.5 Visibility

## 6.1.2 Flight envelope

- 6.1.2.1 Altitude
- 6.1.2.2 Maximum speed
- 6.1.2.3 Stall speed
- 6.1.2.4 Turn radio
- 6.1.2.5 Load factor
- 6.1.2.6 Range

## 6.1.3 Engine

## 6.2 Flight control system and Flight modes

This section briefly describes how the RPAS FCS works as well as the different flight modes available for the system.

[Include the reference document and section where this information is contained for the RPAS subject of this document.]

[Insert a description of the RPAS control system describing the different modules: flight and mission manager. Insert a description of the control and navigation modes: for take-off, in flight and for landing, for instance: automatic and manual. Include the manoeuvres the RPAS is able to perform automatically].

[Insert a description of the RPAS launch and recovery modes in case they are not done from a runway (i.e. catapult, recovery net, recovery hook)]

## 6.3 Nominal operational procedures

This section collects the operation procedures for mission execution in nominal conditions, including day/night and RLOS/BRLOS flights. Activities performed by the RPAS Pilot and RPAS Payload operator [include other role in case needed] as well as their responsibilities are described.

In addition, it is included available information in the GCS for the RPAS Pilot and RPAS Payload operator [include other role in case needed] as well as the sets of commands available to them during the mission. The interface with the RPAS operators is here described. Alarms to be displayed in the GCS during the mission are also detailed.

[Include the reference document and section where this information is contained for the RPAS subject of this document. Include reference to those manuals needed to complete the information provided in the Flight Manual, for instance the GCS Manual, in case they are available]



## 6.4 Emergency operational procedures

This section gathers the operation procedures for mission execution in emergency conditions, including day/night and RLOS/BRLOS flights. Activities performed by the RPAS Pilot and RPAS Payload operator [include other role in case needed] as well as their responsibilities are described.

A list of emergency situations during the mission is provided. For each emergency case, it is described:

- how the emergency is detected by the operator,
- what are the main signs of the emergency (in addition to the one that serves for the emergency detection),
- automatic/ pre-programmed actions executed by the RPAS,
- immediate actions to be executed by the RPAs Pilot/ operator.

[Include the reference document and section where this information is contained for the RPAS subject of this document. Include reference to those manuals that are also needed in order to complete the information provided in the Flight Manual, for instance the GCS Manual, in case they are available. Include a flowchart for each emergency case in case it is available. At least information about topics listed below shall be described in the mentioned document]

### 6.4.1 Identification of critical systems

This section identifies the RPAS critical systems whose failure may result in the loss or severe damage of the RPAS or an equipment/ property on the ground, a serious injury to people or an environmental harm.

Table 12 [RPAS type] [version] critical systems

[RPAS type] [version] Critical systems	
[Critical system#1]	
Name	
General description	
Main parts/ components	
Main characteristics	
Failure implications	
Individual risk and mitigation plan	

## 6.4.2 Automatic/ pre-programmed actions

This section provides a description of the automatic or pre-programmed modes that assures RPAS integrity to continue the mission or to finalise it under safety conditions. Automatic flight protections or limitations are also described, as altitude or fly area limitation.

[Include the reference document where this information is contained for the RPAS subject of this document]

## 6.4.3 Ground emergencies

6.4.3.1 Engine failure during take-off

6.4.3.2 Fuel fire on ground

6.4.3.3 Battery fire on ground

## 6.4.4 Flight emergencies

6.4.4.1 Engine failure during flight

6.4.4.2 Loss of main RLOS link

6.4.4.3 Loss of main BRLOS link

6.4.4.4 Loss of communications (RLOS and BRLOS)

6.4.4.5 FCS failure

6.4.4.6 GCS failure

6.4.4.7 RPAS fire

6.4.4.8 Fuel pressure loss

6.4.4.9 Adverse weather conditions

## 6.4.5 Payload sensors malfunction ?

A list of situations where a payload sensor malfunction occurs and the actions executed by the operator should be listed. For each case, the following is described:

- how the malfunction is detected by the operator,
- immediate actions to be executed by the RPAs Pilot/ operator.

## 6.5 RPAS Performance diagrams

This section contains RPAS performance charts. These charts serve as a reference to know RPAS capabilities and for mission plan and execution.

[Include the reference document and section where this information is contained for the RPAS subject of this document. At least information about topics listed below shall be described in the mentioned document]

- 6.5.1 Stall diagrams (Vs)
- 6.5.2 SEP diagrams
- 6.5.3 ROC diagrams
- 6.5.4 Load factor diagrams
- 6.5.5 Turn rate diagrams
- 6.5.6 Glide performances

## 7. RPAS on-site logistical requirements

This chapter contains information about the logistical requirements/ constraints to accommodate [RPAS type] [version] operations, from the point of view of the on-site activities to be performed during the deployments for the RPAS service.

[Include the reference document and section where this information is contained for the RPAS subject of this document. At least information about topics listed below shall be described in the mentioned document]

### 7.1 Take-off and landing

Table 13 [RPAS type] [version] take-off and landing requirements

Requirements	Description
Type of take-off and landing: runway or platform	
Dimensions runway/platform (length/width or square meters)	
Type of ground (paved, unpaved)	
Installation needs of auxiliary systems (net, launcher, arresting gear)	
Distance to the hangar	
Type of path from hangar to runway/platform	
Distance to the GCS	
Transport means to carry the RPA to the runway/platform	
Wind direction indicator	
Distance to the sea	

## 7.2 Workspace and storage (hangar)

This section defines the indoor and outdoor area for operational tasks on the aircraft, including:

- Preparation for flights (e.g. for fuel, engine tests).
- Maintenance.
- RPAS Storage between flights, including tools and auxiliary equipment.

Table 14: [RPAS type] [version] workspace and storage requirements

Requirements	Description
Entrance (gate dimensions)	
Square meters of workspace	
Offices and meeting rooms	
Electric power supply	
Access restrictions	
Parachute folding area	
Area for fuel tank	
Area for engine tests	
Storage of auxiliary tools (shelves)	
Storage of RPA and spare parts	
Lifting tools: crane, forklift etc.	
Compressed air	
Outdoor lighting	
Water	
Fire extinction means	
Security requirements on the installations	

### 7.3 Ground control station (GCS)

Table 15 [RPAS type] [version] GCS requirements

Requirements	Description
GCS location (integrated inside a shelter or a van, or installed into end-user facilities)	
Area (square meters)	
Visual contact with RPA during take-off and landing	
Power supply needs	
Furniture	

### 7.4 Ground Data terminal (antennas)

Table 16 [RPAS type] [version] GDT requirements

Requirements	Description
Installation type ( <i>fixed installation during the entire deployment or disassembling and storing after each flight</i> )	
Distance to the GCS	
Height	
Other considerations (separation between antennas, etc.)	
Obstacles	

## 7.5 Other requirements

Table 17 [RPAS type] [version] other requirements

Requirements	Description
Terrain characteristics	
Washrooms	
Meteorological data	
Internet access	
[other]	

## 8. RPAS maintenance manual

This chapter describes all necessary instructions for proper maintenance, servicing and handling of the [RPAS type] [version]. Programmed and not programmed (corrective) maintenance are included. Information about RPAS storage is also provided.

[Include the reference document and section where this information is contained for the RPAS subject of this document. At least information about topics listed below shall be described in the mentioned document]

### 8.1 Programed maintenance

#### 8.1.1 Maintenance program

This section includes the schedule for the programmed maintenance actions to be done over the [RPAS type] [version].

#### 8.1.2 Maintenance procedures

This section describes the maintenance actions to be done over the [RPAS type] [version].

- 8.1.2.1 General procedures
- 8.1.2.2 Pre- flight inspections
- 8.1.2.3 50 FH inspections
- 8.1.2.4 200 FH inspections
- 8.1.2.5 Special inspections

- 8.1.3 Life limited components
- 8.1.4 Servicing
- 8.1.5 Handling
- 8.1.6 Storage

### 8.2 Corrective maintenance

#### 8.2.1 Troubleshooting

This section includes actions to be done over the [RPAS type] [version] in order to systematically search for the source of a system failure. Each failure case includes the way the failure is detected and the steps to follow to identify the failure, as well as how to solve/ repair it.

#### 8.2.2 Repair procedures

[Describe what are the and who is entitled to perform repair procedures on the RPAS]



## 9. RPAS Technical logbook

RPAS technical logbook is included as an appendix at the end of this document, updated till the date the present document is issued. Each [RPAS type] [version] tail number counts with its technical logbook, that shall accompany it during its entire service life.

[Include the reference document where this information is contained for the RPAS subject of this document. At least information about topics listed below shall be described in the mentioned document]

### 9.1 Open actions

Defects and failures found, during the operation or maintenance, are presented in this section of the logbook. Information about the date of the detection, the status (open/ closed) as well as the person responsible of providing the solution are indicated. The action is closed once the solution is implemented. The closing date is also recorded.

### 9.2 Flights record

Information about missions performed. This section shall contain information for each flight including:

- Date.
- RPAS model, version and tail number.
- Configuration.
- Duration of the flight (FH).
- Take- off time
- Landing time.
- Mission chief signature.

### 9.3 RPAS equipment list

Information about RPAS configuration shall be declared, including:

- Equipment PN.
- Serialised equipment list (components with SN). In case of change/ substitution of one equipment/ part, its SN shall be also changed and the date of the change recorded.
- Software configuration. Version of the software installed in the main equipment.

## 10. Operational risk assessment and mitigation plan

This section describes an operational risk assessment and mitigation plan for the operation of RPAS in sea areas surrounding EU. Despite this document, the Aviation Regulators/Authorities shall be always responsible for defining their mandatory requirements for assessing the hazards posed by the operations of RPAS and the mitigation measures that need to be implemented.

*JARUS guidelines on Specific Operation Risk Assessment (SORA)*<sup>2</sup> and *Safety Management Manual (SMM)* by ICAO<sup>3</sup> can be used as a basis for the development of this chapter. These documents propose a methodology for the risk assessment for RPAS operations using the Holistic Risk Model (HRM). The model considers threats of all nature for a specified hazard, the relevant mitigations, and evaluates them systematically to determine the boundaries for a safe operation.

The operation of RPAS carries risks for the other airspace users and for life and property on the ground. Therefore a thorough hazard identification and risk analysis of the aircraft and the supporting system must be performed in order to ensure that the RPAS will be operated with a well-known and approved level of safety for other airspace users and life and property on the ground.

This risk assessment and mitigation plan includes the identification of all the hazards for the RPAS operation, the analysis of the risk and the proposed mitigating measures in accordance to the methodology accepted and recognised by the aviation community.

The safety risk analysis covers all the activities from the moment the RPAS comes out of the hangar in ready to fly configuration to the moment the RPAS comes into the hangar after carrying out the flight. It will be adapted on a case by case basis according to each operation.

[Include the reference document and section where this information is contained for the RPAS subject of this document. At least information about topics listed below shall be described in the mentioned document]

### 10.1 Key factors that affect the safety of the operation of the RPAS

This section contains information about the key factors that affect the safety of the operation of the RPAS:

- Area of operation: mainly over the sea, density of vessels, corridors over the ground, distance to populated areas, etc.
- Safety measures of the RPAS: i.e. redundancies, automatic emergency procedures, parachute, and flight determination unit, detect and avoid system, etc.
- Air traffic control (ATC) procedures: communication, transponder, ADS\_B, etc.

[List all the key factors that affect the safety of the operation of the RPAS, and describe them briefly]

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<sup>2</sup><http://jarus-rpas.org/content/jar-doc-06-sora-package>

<sup>3</sup> <https://www.icao.int/safety/SafetyManagement/Documents/Doc.9859.3rd%20Edition.alltext.en.pdf>

## 10.2 Risk analysis and mitigating measures

This section evaluates the risks involved in the RPAS operation, in order to support the application for an authorization to operate the RPAS, it is to obtain a permit to fly. The HRM was developed to support the assessment of the risks involved in the operation of the RPAS, providing a generic framework to identify the hazards, threats and the relevant mitigations (also called harm and threat barriers) applicable to any operation.

In order to perform the Risk assessment, the steps listed below are followed:

- Identification of the phases of the mission.
- Identification of potential hazards related to each phase of the mission.
- For each hazard identified:
  - Identification of who may be in danger, in case of the hazard occurrence.
  - Identification of the existing measures to reduce the likelihood of the hazard, or the severity of the hazard in case of its occurrence.
  - Identification of the risk ratings for likelihood and severity.
  - Description of the results of comparing the risk ratings.

In this section, a table or worksheet addressing the risk analysis and the mitigating measures is provided, including, at least, the information described in next table.

Table 18 Description do the risk analysis parameters and mitigating measures.

Phase	Hazard	Risks	Causes	Existing measures for mitigation	Probability <sup>4</sup>	Severity <sup>5</sup>	Risk index and/or Risk level
Taxing, taking-off, landing, flight and/or other additional phases	hazards attending to their category/ source	potential consequences of a hazard	potential factors that can lead up to the incidents or accidents	design solutions and operational procedures to mitigate the probability of occurrence and/or the severity of the consequences	likelihood or frequency that a safety consequence or outcome might occur	assessment of the potential consequences of the hazard	derived from the severity and probability of each risk; the tolerability must be acceptable in order to be able to obtain a permit to fly

<sup>4</sup> Categorisation according to Table 19.

### 1.1.1 <sup>5</sup> Categorisation according to Risk severity

Table 20.

Following tables describe the risk probability and the risk severity categories, respectively, and are used to assess the risk ratings.

### 10.2.1 Risk probability

Table 19 Risk probability categories, according to the Safety Management Manual (SMM) by ICAO.

Likelihood	Meaning	Value
Frequent	Likely to occur many times (has occurred frequently)	5
Occasional	Likely to occur sometimes (has occurred infrequently)	4
Remote	Unlikely to occur, but possible (has occurred rarely)	3
Improbable	Very unlikely to occur (not known to have occurred)	2
Extremely improbable	Almost inconceivable that the event will occur	1

### 10.2.2 Risk severity

Table 20 Risk severity categories, according to the Safety Management Manual (SMM) by ICAO.

Severity	Meaning	Value
Catastrophic	<ul style="list-style-type: none"> <li>Death(s)</li> <li>Equipment destroyed</li> </ul>	A
Hazardous	<ul style="list-style-type: none"> <li>Serious injury</li> <li>Major equipment damaged</li> <li>Large reduction in safety margin, physical distress or a workload such that the operators cannot be relied upon to perform their tasks accurately or completely</li> </ul>	B
Major	<ul style="list-style-type: none"> <li>Injury to persons</li> <li>Serious incident</li> <li>Significant reduction in safety margins, a reduction in the ability of the operators to cope with adverse operating conditions as a result of conditions impairing their efficiency</li> </ul>	C
Minor	<ul style="list-style-type: none"> <li>Nuisance</li> <li>Operating limitations</li> <li>Use of emergency procedures</li> <li>Minor incidents</li> </ul>	D
Negligible	<ul style="list-style-type: none"> <li>Few consequences</li> </ul>	E

[The risks may be prioritized if the RPAS contractor deems it necessary]

The list below includes all the hazards considered as the minimum list of risks to be analysed by the RPAS contractor [Additional hazards shall be assessed based on RPAS contractor experience and on the specific operation constraints]

Table 21 Minimum list of hazards to be assessed

Phase <sup>6</sup>	Hazard
Take-off, flight and landing	Bad weather conditions
Take-off, flight and landing	RPA excursion out of path
Flight	Loss of controllability (causes: computer failures, structural failure, icing, actuators failure...) <sup>7</sup>
Flight	Loss of communications
Flight	Loss of GPS
Flight	Engine failure
Flight	Power supply failure
Flight	GCS display failure
Flight	Mid-air collision
Flight	ATC communications failures
[Additional hazards based on RPAS contractor experience and on specific operation constraints]	

### 10.2.3 Risk acceptability matrix

Tables representing risk index matrix (severity x likelihood) and risk acceptability (tolerability) are also included.

[Include risk index matrix (severity x likelihood) and risk acceptability (tolerability) tables]

## 10.3 Liability insurance

The “Regulation (EC) No 785/2004 of the European Parliament and of the Council of 21 April 2004 on insurance requirements for air carriers and aircraft operators” should be followed and ceilings should be high enough to cover potential third party liability.

Liability insurance for the operations is included as an appendix at the end of the document.

## 10.4 In-service accident rate

[List and insert a brief description of the incidents occurrence, including the impact and the root causes. Detail also if the incident was reported to EASA or Aviation National Authorities]

<sup>6</sup> Hazards must be specified for at least the operational phases listed in the table.

<sup>7</sup> This hazard assessment must cover all the possible failures that could cause the loss of the controllability of the RPA (with risk of uncontrollable stall therefore of striking people or property on the ground). Specific mitigating measures must be applied to each one of the possible causes.

## 11. Generic safety case

This chapter contains the [RPAS type] [version] Safety Case detailed in accordance with the NAA. It is intended to justify that the RPAS is acceptably safe for a typical operation environment. In addition, this Safety Case will be adapted on a case by case basis according to each operation/ deployment, demonstrating that the system is acceptably safe for a specific application in a specific operating environment.

[Include the reference document and section where this information is contained for the RPAS subject of this document. At least information about topics listed below shall be described in the mentioned document]

Following information is described in this section:

### 11.1 Identification of the safety issues

Identification of the safety issues associated with the operation. At least these safety risks are considered:

- Harm to people on the ground.
- Damage to critical and sensitive infrastructure.
- Collision in the air.

### 11.2 Risk assessment and mitigating strategies

Description of the measures and barriers used to mitigate the risks.

### 11.3 Conclusions

Conclusions about the acceptability of the system in relation with the safety issue, considering the RPAS design, procedures and the mitigations put in place.

## 12. Quality assurance plan

This chapter describes the processes and procedures to check and improve the overall functioning, performance and quality of the RPAS service provided by [RPAS contractor].

A set of planned, systematic actions to ensure that the service comply with the requirements is provided. Service quality is checked in a planned way through all the phases of the provision. Activities, standards, means and processes necessary to achieve the required quality in the service provision are described.

[Include the reference document and section where this information is contained for the RPAS subject of this document. At least information about topics listed below shall be described in the mentioned document]

The project quality plan:

- Describes the nature of the service and the quality expectations.
- Sets out the [RPAS contractor] quality policies (standards and procedures) [for example if they are ISO 9001 certified] and how these policies will apply to the project.
- Sets out quality roles and responsibilities.
- Describes how quality is managed.
- Describe the resources required.
- Describes the activities necessary to provide the service and the order in which they will be carried out.
- Describes document control procedures.
- Describes configuration control procedures.
- Describes quality audits.
- Describes monitoring and reporting procedures and the process for delivering continuous improvement.
- [adapt this list in accordance with the contents of the QA plan provided]

### 12.1 Project description

[Insert a brief description of the project, the provided services through RPAS and the FWC. This description will be adapted for each operation/ deployment]

### 12.2 Main quality objectives

[List and describe the main quality objectives for this project]

### 12.3 Standards and Procedures

[List the policies, standards, and directives as well as externally imposed standards that shall be taken into account in the project. Refer to the relevant descriptions.]

### 12.4 QA organisation and responsibilities

[The project management process is monitored by several performance indicators, i.e. rates of projects in conformity with the forecasts; these calculate the conformity rate of the projects to the requirements.]

#### 12.4.1 QA organisation and structure

[Describe the project organisation mentioning the QA organisation: who is responsible for the quality assurance and control, and for the overall processes performed; QA manager responsibilities; staff nominated as the QA.]

#### 12.4.2 QA function responsibility

[Describe the function and responsibilities of the QA, for example: quality control of the overall processes performed by the company; insurance that applicable standard quality procedures are applied along the project life; revision of applicable documentation; configuration control and notes release; lease with que quality responsible from other parties]

## 12.5 Quality management system activities

[Activities related to production, control, delivery and post-delivery services provided must be completely identified and described in this document, along with the relevant responsibilities and resources needed.]

## 12.6 Resources management

[The following topics should be addressed:

- percentage of time the company's QA is assigned with, based on schedule needs;
- guarantee of the QA responsible qualifications and previous experience in quality assurance activities, and knowledge in the techniques, methods, standards and practices to be used in the project;
- staff management: key personnel availability and change, escalation for incident management;
- management tools to be used for risks tracking and internal actions.]

## 12.7 Product realisation activities

[The following topics should be addressed:

- Planning of deliverables;
- Customer related processes: adaptation to EMSA requirements;
- Design and development of the project (logic and related milestones);
- Purchase and sub-suppliers procurement; monitoring the life-cycle of components;
- Production and service provisioning; monitoring the life cycle of components;
- Control of monitoring and measuring devices, i.e. operation and maintenance of sensors included in the system;
- Reliability and maintainability.]

## 12.8 Document and configuration control management

[Include the reference document and section where this information is contained for the RPAS subject of this document.]

## 12.9 Quality Audits

[Specify all quality audits to objectively verify compliance to policies, standards, and defined procedures. Define the responsibility for calling the audits and how they are being coordinated and reported.]

## 12.10 Measurement, analysis and improvement activities

[The following topics should be addressed: customer satisfaction, control of non-conforming product, and data analysis; operation monitoring tools]



## Appendix A Previous permits to fly or certificates

[List and reference proof of previous flight approvals already received for the RPAS and experience of the personnel with ATM procedures for integration of its RPAS into the airspace]

Date	Country of the deployment	Issued by	Reference	Remarks
[mm.yyyy]	[Name of the country]	[National entity]	[insert reference]	[in case needed]

## Appendix B Flight hours

[List and reference proof of Flight Hours already flown by the RPAS. Include:

- Timeframe.
- RPAS configuration.
- Place.
- Information about the context within the flights were performed: flight tests for development, research, dry run tests, service provision, etc.

[proof can be provided through logbook records]

Date/ Timeframe	RPAS configuration	RPAS SN (Tail Number)	Place	Reference	Remarks	Flight Hours
From [mm.yyyy] to [mm.yyyy]	[specify RPAS configuration]	[specify RPAS SN]	[indicate the place(s)]	[insert reference]	[context]	[No FH]
[RPAS type] [version] [configuration#] Total FH						[No FH]
From [mm.yyyy] to [mm.yyyy]	[specify RPAS configuration]	[specify RPAS SN]	[indicate the place(s)]	[insert reference]	[context]	[No FH]
[RPAS type] [version] [configuration#] Total FH						[No FH]

## Appendix C RPAS operation authorised personnel certificates

[Insert the training certificates of authorised personnel for RPAS operation. Update this section when required in case expiration, renovation or addition of certificates.]

## Appendix D RPAS technical logbook

[Insert the RPAS logbook updated till the date this document is issued..]

## Appendix E    Liability insurance for the operations

[Insert reference document and enclose the Insurance]

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