Operations manual / OM

for the operation in SAIL II of unmanned aircraft systems (UAS)

Note

According to Commission Implementing Regulation (EU) 2019/947, an application for an operational authorisation in the specific category shall include an operations manual (OM), together with the associated specific operations risk assessment (SORA) and the evidence of compliance. These constitute the comprehensive safety portfolio.

This document represents an example of an OM developed for a UAS operation, conducted by a medium-sized operator, and having the following characteristics:

— conducted in visual line of sight (VLOS) over a sparsely populated area;

— using a multicopter UA with a characteristic dimension of less than 3 m (mass of reference 12.5 kg).

Basic SORA data for the UAS operation covered by this OM:

— GRC 3,

— M1-0-none,

— M2-0-none,

— M3-0-medium,

— ARC-b,

— ARC-mitigations-none

— SAIL II operation

A UAS operator may use this OM, however, it is not possible to use this OM immediately, since the UAS operators are required to adapt for their needs. Parts of the OM that a UAS operator has to modify, as a minimum, are shown in yellow.

This example is intended to serve as a structuring aid and to provide the UAS operator with ideas and inspiration for how proofs could be implemented when describing your operation.

The European Union Aviation Safety Agency (EASA) or national aviation authorities (NAAs) shall not be liable for any damages of any kind, arising from the use of this document.

No legal claim can be derived from the information given in this document.

The NAA where the UAS operator is registered is responsible to evaluate the documentation submitted by the applicant and, when satisfied, issue the operational authorisation. Such NAA keeps the final decision on the acceptability of the OM.

Whether the present formulations are sufficient for your operation is within the discretion of the respective NAA.

Unless explicitly stated otherwise, all references to legislation refer to Commission Implementing Regulation (EU) 2019/947.

Notes such as '**OSO#23_IC1**' provide the link to the SORA provisions. For example, this means that the related paragraph deals with the requirements of OSO number 23, integrity-criterion No 1. This information is provided for completeness and may be removed in the final version of the OM.

References

Easy access rules for unmanned aircraft system, edition September 2022[1], including:

- Commission Implementing Regulation (EU) 2019/947;
- Commission Delegated Regulation (EU) 2019/945;
- Acceptable Means of Compliance and Guidance Material (AMC & GM) to Commission Implementing Regulation (EU) 2019/947.

[1] https://www.easa.europa.eu/en/document-library/easy-access-rules/easy-access-rules-unmanned-aircraft-systems-regulations-eu

OPERATIONS MANUAL

This operations manual contains all the relevant information related to the UAS operation of:

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UAS OPERATOR REGISTRATON NUMBER

DEUist42HSD12345

Document Control

The contents of this document and all other applicable documents are subject to revision control and changes require prior approval of the competent authority.

Revision number	Revision date[2]	Name	Description of the change
0	1.1.2022	Lisa Musterfrau	First creation of the OM. Structured in accordance with the template published on the EASA website. Adaptation to our own operation where necessary. Insertion of the organisation chart of the operating company.
1	2.1.2022	Max Mustermann	Correction of various spelling errors. Changes to the wording in Chapters 2, 4 and 7
2	5.1.2022	Lisa Musterfrau	UAS 2 added.

All changes to the last revision will be marked with a bar on the left side.

[2] Date when the manual is approved by the NAA.

Other applicable documents

Name	Revision number	Description
Flight_Area_01_R1.kml	1	KML-File with all coordinates for FG, CV and GRB
Flight_Area_02_R1.kml	1	KML-File with all coordinates for FG, CV and GRB
OM D	-	Training manual, ifPart D was outsourced and is not under revision control
		further documents, if referenced in the OM

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List of Abbreviations

Term	Explanation
ALOS	attitude line of sight
ARC	air risk class
ATM	air traffic management
CM	command unit
CU	contingency volume
DLOS	detection line of sight
FG	flight geography
GRB	ground risk buffer
GV	ground visibility
NAA	national aviation authority of the Member State (MS) where the UAS operator is registered
METAR	meteorological aerodrome report
OM	operations manual
RPIC	remote pilot in command
T/O	take off
TMPR	technical mitigations performance requirements
UA	unmanned aircraft
UAS	unmanned aircraft system
VLOS	visual line of sight

The table should be filled in with all the abbreviations used in the OM. A list of abbreviation may be found at page 15 of the Easy Access Rules for Unmanned Aircraft Systems (Regulations (EU) 2019/947 and 2019/945).[3]

[3] https://www.easa.europa.eu/en/document-library/easy-access-rules/easy-access-rules-unmanned-aircraft-systems-regulations-eu

1 General part (Part A) [4]

1.1 Opening Statement

This operations manual has been developed in accordance with the specifications and requirements of Regulation (EU) 2018/1139 and its implementing regulations. Among others, Commission Implementing Regulation (EU) 2019/947 and Delegated Regulation (EU) 2019/945 were taken into account.

I, the accountable manager, declare that at any time the UAS operation will be conducted in accordance with the requirements and limitations described in this operations manual (OM).

Moreover, I declare that all personnel involved in the UAS operation shall:

- be familiar with the contents of this OM;
- follow the instructions and procedures from this OM;
- comply with the laws, rules and procedures of the countries in which the operation is carried out;
- always make the UAS operation as safe as it is practicably possible;
- not take any unnecessary risks;
- report safety risks and all incidents that affect safety.

We as a UAS operator commit ourselves to:

- promote and execute safe operations wherever possible;
- establish a safety culture that ensures safe operation and promote a reporting system of safety-relevant issues,
- provide adequate financial and human resources for this purpose;
- ensure that all information in this OM complies with the applicable statutory rules and requirements;
- implement and maintain a 'Just Culture'. No employee should suffer reprisals for reporting safety deficiencies, mishaps or violations that very likely would not have been discovered without their report;
- comply with new or amended regulations published by the EU Commission, EASA, or the national aviation authority (NAA), even if such new or amended regulations conflict with these procedures. Changes to the regulatory framework affecting the content of this manual will be promptly incorporated into it and submitted to the NAA for approval.

None of the foregoing shall prevent the operator's personnel from acting in good faith to the best of their knowledge and belief when this OM does not provide assistance or guidance.

We expect all staff to show initiative, decision-making ability and to have a professional work attitude.

Place, date

Signature of the accountable manager

[4] OSO#01

1.2 Security and privacy statement

Personal data collected in the course of the operation described in this OM shall be processed in accordance with Regulation (EU) 2016/679 of the European Parliament and of the Council of the 27 April 2016 on the protection of natural persons with regard to the processing of personal data, on the free movement of such data and repealing Directive 95/46/EC (General Data Protection Regulation).

Personal data is collected and processed only to the extent strictly necessary for the operation described herein.

For further information regarding the processing of the data (for example, to correct incorrect or incomplete data), please contact our secretariat directly.

Every affected data subject has the right to lodge a complaint regarding the processing of his / her data with the Federal Commissioner for Data Protection and Freedom of Information at any time.

Place, date

Signature of the accountable manager

1.3 Environmental statement

We as a company are committed to sustainable and future-oriented drone operations and pursue the goal of minimising the impact on the environment and wildlife.

To this end, our company will use all technical possibilities to increase efficiency as well as look for further innovative solutions.

The goal is to use less and 'greener' energy in the long run and to cover the reduced energy demand with cleaner, more sustainable and regenerative energy.

The aim is to leave each flying site in a condition at least equal to that in which it was found.

All employees are encouraged to be aware of their surroundings at all times and to reduce any direct impact on people, the environment and wildlife through noise or emissions to an absolute minimum.

For further information regarding our environmental policy, please contact our secretariat directly.

Place, date

Signature of the accountable manager

1.4 The UAS operator organisation[5]

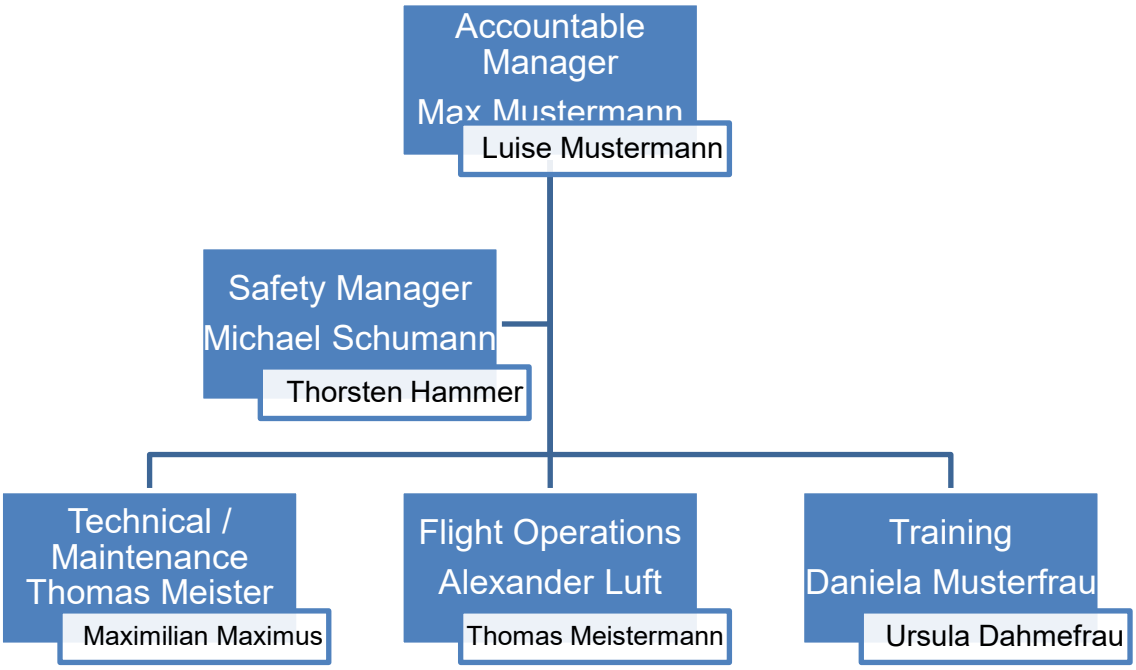
Please briefly describe your organisation and the scope of the UAS operation. (Example below)

Our company develops and distributes sensor products for the identification of metallic objects in the ground. These sensors are designed to be mounted on a UAS in order to be able to examine larger ground areas. To this end, we regularly carry out test flights to improve our product.

Our company was founded in 2018 and consists of a total of five permanent employees. All of these people are responsible for an assigned area.

As shown in the organisation chart, all positions essential to our flight operations are staffed. The tasks that these people perform are the foundation of our safe flight operations.

1.4.1 Structure / organisation chart



The duties of the individual responsible employees are described below[6].

Description of duties and responsibilities:

Accountable Manager:

Please describe the duties and responsibilities

Safety Manager:

Please describe the duties and responsibilities, if applicable

Technical / Maintenance:

Please describe of the duties and responsibilities, if applicable

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5 OSO#01

6 A UAS operator should have at least an accountable manager and a flight operations manager. Depending on the complexity of the operation, a person may cover more than 1 position (meaning that a UAS operator may be made of only 1 person). The second name in the chart is the name of the deputy, if available.

Training:

Please describe of the duties and responsibilities, if applicable

Flight Operations:

Please describe the duties and responsibilities

1.5 Change management

The UAS operator will assess the impact of changes in the organisational structure or processes related to the operation of the UAS, in relation to the safety of the operation.

If risk factors can be identified during this assessment, they shall be taken into account before the change is implemented. For this purpose, a concept that reduces the critical impacts on operations will be developed.

All changes in the organisational structure or processes related to the operation of the UAS will be amended in the OM.

All changes of the OM are subject to prior approval of the NAA issuing the operational authorisation.

1.6 Retention periods

All important documents of the UAS operation are kept in digital or analogue form for at least three years after the end of the UAS operation or for the personnel, three years after the person has ceased employment with the organisation or has changed position in the organisation. The records are protected against loss or alteration and are made available to authority for inspection.

These include, but are not limited to, the following:

- all authorisations issued by the authorities, including operational authorisations issued by the NAA and all flight authorisations for geographical zones issued by the authority in charge of such zone;
- any written permission to fly into a control zone;
- technical logbook with records of flights carried out;
- maintenance records / protocols;
- records and updates of all relevant qualifications, experience and / or training completed by maintenance personnel, remote pilot, observers (if applicable) and any other personnel essential for ensuring the safety of the operation[7]. (see form in Annex, paragraph 8.2.3);
- minutes of all meetings with regard to safety-relevant topics (flight safety, security, occurrence reports, investigations); and
- all documents considered important that enable the operator's actions to be traced. Please name these documents.

1.7 Document control

Each new employee is sent an up-to-date set of valid documents by e-mail to his / her work e-mail address or is given a set as a hard copy when he / she is inducted.

Afterwards, individual documents whose revision has changed are sent to each employee by e-mail.

It is the employee's responsibility to always work with the current valid version. A list of the current revision numbers of all documents can be viewed in the company office at any time or can be sent by e-mail from the office during business hours.

In addition, documentation lists are kept and updated. The current lists are available in the company office at all times and can be viewed or can be sent by e-mail during business hours.

At least the following documents need to be maintained and regularly updated:

- list of personnel authorised to carry out maintenance activities. A standard form can be found in the Annex, paragraph 8.2.1[8].
- list of all relevant personnel qualifications, experience and / or training. A standard form can be found in the Annex, paragraph 8.2.3.[9]
- list of personnel authorised to carry out preflight and postflight inspections is maintained and regularly updated. A standard form can be found in the Annex, paragraph 8.2.2[10].
- technical logbook documenting the preflight and postflight inspections carried out. A standard form can be found in the Annex, paragraph 8.2.6[11].
- list of all emergency response plan (ERP) training conducted. A standard form can be found in the Annex, paragraph 8.2.5[12].

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7 **OSO#03_AC2**

8 **OSO#03_AC1c**

9 **OSO#03_AC2**

10 **OSO#07_AC2**

11 **OSO#07_AC1**

12 **M3_C2b**

- list of all remote pilots who meet the requirements and are authorised to fly under this OM. A standard form can be found in the Annex, paragraph 8.2.4.

1.8 Personnel requirements and qualifications

All personnel involved within the scope of this OM shall be able to read and understand it autonomously. The minimum qualifications of the personnel involved in the operations are described in the following paragraphs.

1.8.1 Remote pilot

- Remote pilot and /or RPIC (remote pilot in command) shall:
  - at least hold a remote pilot certificate A2 or STS (standard scenario) certificate;
  - successfully complete training in accordance with the training manual (Part D);
  - successfully complete training on the ERP within the last twelve months;
  - have conducted UAS flight as a remote pilot with a UAS of the same configuration (for example, multi-copter / fixed-wing aircraft) within the last ninety days.
- Remote pilot, co-remote pilot in the case it is applicable to the UAS operation shall:
  - at least hold a remote pilot certificate A2 or STS licence;
  - successfully complete training in accordance with the training manual (Part D);
  - successfully complete training on the ERP within the last twelve months;
  - have conducted UAS flight as a remote pilot with a UAS of the same configuration (for example, multi-copter / fixed-wing aircraft) within the last ninety days.
- Remote pilot under supervision (for example, for training purposes) shall:
  - at least hold a remote pilot certificate A2 or STS certificate;
  - successfully complete theoretical training in accordance with the training manual (Part D);
  - successfully complete training on the ERP within the last twelve months.

1.8.2 Maintenance personnel

- Mechanic shall:
  - have technical experience, including experience with UAS;
  - successfully complete training in accordance with the training manual (Part D);
  - successfully complete training on the ERP within the last twelve months.

1.8.3 Ground staff, if applicable to the UAS operation shall

  - successfully complete training in accordance with the training manual (Part D);
  - successfully complete training on the ERP within the last twelve months.

1.8.4 If the UAS operator offers training, then the personnel involved in training, examination and supervision shall have the following qualifications:

- Remote pilots:
  - at least as under 1.8.1;
  - at least one year experience in the current operation.
- Maintenance personnel:
  - at least as under 1.8.2;
  - at least one year experience in the current operation.

1.9 Crew Member is 'fit for the operation'[13]

Prior to commencing the operation, each crew member declares himself / herself 'fit to operate' and that there are no conflicts with paragraph 1.9.1 (preventive health care) or paragraph 1.9.2 (flight duty and rest periods) and that he / she can perform his / her duties and tasks during the UAS operation without restrictions.

If a conflict exists regarding any point of either of the two paragraphs, the crew member should report 'unfit to operate' to the flight operations manager. This may be done in writing or by telephone.

The performance of his / her duties, including the limited or only partial assumption of further duties in the company, is no longer permitted thereafter.

1.9.1 Preventive health care

Preventive health care is an important part of ensuring safe operations.

Everyone should try to keep as healthy and fit as possible. This applies in particular, but not exclusively, to the following:

- **Alcohol and other intoxicating liquids**
  It is the company policy to prohibit any work under the influence of alcohol or other intoxicating liquids. Any consumption of alcohol within eight hours before the start of operations is prohibited. The blood alcohol level shall be 0.0 ‰ at the latest at the time when the operation preparation is started.
- **Narcotics**
  Psychoactive substances such as narcotics can cause mood swings or perceptual disturbances in people. The same applies to sedatives and hypnotics.
  It is not permitted to perform the tasks or activities described in this OM while under the influence of narcotics.
  Any and all violations of this prohibition shall result in immediate suspension from all duties related to the operation described herein. The position or task within the company of the person concerned is irrelevant.
- **Drugs**
  Psychoactive substances such as drugs can cause mood swings or perceptual disturbances in people. Examples include cannabis, cocaine, heroin, LSD, etc.
  It is not permitted to perform the tasks or activities described in this OM while under the influence of drugs.
  Any and all violations of this prohibition shall result in immediate suspension from all duties related to the operation described herein. The position or task within the company of the person concerned is irrelevant.
- **Sleeping tablets**
  It is not permitted to perform the tasks or activities described in this OM while under the influence of sleeping tablets.
- **Antidepressants**
  It is not permitted to perform the tasks or activities described in this OM while under the influence of antidepressants.
- **Medical treatments**
  Whenever a crew member is receiving medical treatment from a doctor, he / she should inform the doctor that he / she is carrying out safety-related activities in connection with the operation described here to ensure that he / she is not subject to any restrictions in this regard. Whenever there is any doubt about unrestricted fitness, the crew member should report 'unfit to operate' to his / her employer.

[13] OSO#17

- **Immunisation**
  Each crew member is responsible for ensuring that they have the required vaccinations. Vaccinations should take place at least 24 hours before the time when operational preparations begin. Consumption of food or drinks containing alcohol should be avoided during this period. In the event of a severe reaction to the vaccine, it is imperative that a doctor is consulted.
- **Deep sea diving**
  Due to the expected effects on the human body, deep sea diving is prohibited for all crew members for a period of 24 hours prior to the start of operational preparations. Shallow depth dives without the use of compressed air remain permitted.
- **Blood and bone marrow donations**
  Blood or bone marrow donations shall have been made at least 72 hours before the start of operational preparations.
- **Precautions regarding meals before and during operation**
  No special precautions need to be taken. However, each crew member is encouraged to let us know in good time if they feel unwell after eating a meal.
- **Sleep and rest**
  Individual rest periods, holidays or days off (for example, weekends) should be used for relaxation. Activities that conflict with this should be avoided.
- **Surgical operations**
  After surgery, it is the responsibility of the crew member to check with his / her doctor whether he / she is fit enough to discharge his / her responsibilities. Whenever there is any doubt about full fitness, the crew member should report 'unfit to operate' to his / her employer.
- **Smoking**
  Smoking is forbidden during flight operations.
- **Vision aids**
  Whenever a crew member is required to wear vision aids, he / she shall, if possible, carry a spare pair of spectacles / contact lenses with him / her during flight operations.

1.9.2 Duty hours and rest periods

The flight duty hours and rest periods listed in this paragraph are maximum values. These apply to all crew members involved in the operation of a UAS within the scope of this OM. They may be further limited, but not extended, by company agreements or collective agreements.

1.9.2.1 Definition of terms

- **Flight area**
  In the context of flight duty hours and rest periods, a flight area is considered as the area where the UAS operates and, after the landing, the UAS is moved using additional means (e.g. a car). The same applies to the command unit, should its relocation involve great effort.
- **Duty period**
  A period of time that begins when a crew member reports for duty or commences duty and ends when the crew member is free from all duty obligations, including postflight activities.
- **Flight time (block time)**
  The period of time between the moment the UAS is able to move under its own propulsion until the primary propulsion system is shut down.
- **Rest period**
  A continuous, uninterrupted and fixed period of time following or preceding duty during which the crew member is free from duty and standby duty.

1.9.2.2 Flight and duty period

- The **maximum duty period** for all crew members is: thirteen hours
  The maximum duty period is reduced by one hour with each new flight area.

Example for three additional flight areas:
The maximum duty period / day = 13h - 3x1h = 10h

- The **maximum flight time (block time)** / day for all remote pilots is: four hours

1.9.2.3 Rest Times

The minimum rest period between two duty periods is at least the same duration of the last duty period, but not less than eight hours.

In addition, each crew member shall have at least one full day off from duty or standby duty at least every seven days.

2 Procedures (Part B)[14]

All procedures and checklists described in this chapter have been designed to the best of our knowledge and belief, taking into account all practical experience gained and the expected workloads for the crew and the RPIC. [15]

This was done with the aim of making them clear, understandable and applicable, while minimising the impact of human error[16].

The RPIC has the authority to cancel or delay any or all flights, if he / she believes that:

- the safety of persons is threatened; or
- property on the ground is threatened; or
- other airspace users are put at risk; or
- there is a violation of the limits defined in the operational authorisation.

The RPIC ensures to:

- be able to take manual control of the UAS at any time, even if it normally operates automatically[17];
- only operate one UA at a time;
- not operate from a moving vehicle; and
- not handover the control of the UA to another command unit while operating.

The suitability of the contingency and emergency procedures described in this chapter have been tested under safe conditions during test flights conducted in an area compatible with the subcategory A1 of the open category. All procedures have been found to be effective and suitable[18].

2.1 Multi-crew coordination[19]

When the RPIC cooperates with other UAS personnel or involved persons are present in the flight area, the RPIC shall conduct a safety briefing before each flight. During the briefing, care shall be taken to ensure that:

- the roles are clearly assigned.
- everyone understood their role (co-pilot, assistant, etc.) and the associated tasks[20].
- the communication channels to be used (oral, radio, etc.) have been clearly identified.
- clear and effective communications are ensured (no language barrier, use of the same terms and call outs, etc.)[21].
- the ERP checklist developed for the flight location is reviewed, and all emergency procedures are clear to all personnel.

The terms and call-outs used in the communication are, where necessary, explicitly specified in the procedures.

14 OSO#01, OSO#08, #11, #14, #21

15 OSO#08, #11, #14, #21_ACa, OSO#16_AC1

16 OSO#08, #11, #14, #21_IC3

17 OSO#08, #11, #14, #21_IC2

18 OSO#08, #11, #14, #21_ACb

19 OSO#16

20 OSO#16_IC1a

21 OSO#16_IC1b

2.2 Flight planning[22]

2.2.1 Use of up-to-date materials

For flight planning, the UAS operator ensures that the personnel always use the most current maps and charts and any other data available. For all data that is only updated at long intervals (e.g. ICAO charts or satellite images, NOTAM (Notice to Airmen)), updates or on-site inspections are also taken into account.

For the weather forecast in particular, the meteorological data that is used as the basis for planning is documented, and the planning is updated in the event of changes that need to be taken into account.

If the UAS is equipped with a geocaging system, the limits of the flight area as described in Chapter 3 will be identified and uploaded to the UAS.

Before each flight, the remote pilot verifies that the conditions of the flight area have not changed in regard to the assumed risk of operation (e.g. area is really sparsely populated and no assemblies of people are present).

In case all or a part of the flight is conducted automatically (without manual control of the RPIC), the RPIC will plan the flight, making sure the UA never exceeds the limits of the flight geography (both horizontal and vertical). The RPIC will then upload on the UAS the data related to the flight.

All other automatic functions on board of the UAS (e.g. return to home) shall be set up as needed for the flight.

2.2.2 Geographical zones

Geographical zones published by the Member State where the flight takes place are taken into account in the planning, and before conducting each flight, compliance with the requirements has to be assured. The RPIC will check the following website:

www.dipul.de

If the UAS is equipped with a geo-awareness system or a geofencing system or a geocaging system, the geographical zone data shall be uploaded to the UAS.

The RPIC will check that the operational volume and ground risk buffer are outside of a geographical zone, unless having a flight authorisation to enter there.

[22] **OSO#08, #11, #14, #21_IC1a**

2.3 External Services and Systems

2.3.1 Services[23]

List of the external services used in the UAS operation (for example GNSS, LTE, etc.)

It is ensured that the level of performance for all external services is adequate for the planned operation and its safe execution. Should an external service require communication between the UAS operator and service provider, effective communication is ensured to support the provision of the service. The roles and responsibilities of both parties are clearly defined.

2.3.2 Systems[24]

GNSS

To verify that the GNSS is not disturbed by foreseeable phenomena, a check is made before each flight to see whether disturbances are to be expected. The forecast shall not be older than eight hours at the start of the flight.

A flight in the event of predicted restrictions or disruptions is not permitted.

Forecasts are available on the websites of Eurocontrol or the 'Space Weather Prediction Center'.

- https://augur.eurocontrol.int/tool/
- https://www.swpc.noaa.gov/communities/global-positioning-system-gps-community-dashboard

2.4 Procedures for obtaining and evaluating weather conditions[25]

The checking of the weather condition takes place immediately before the start of the flight.

The national drone weather provided by the state, which is used for data collection is:

www.dipul.de

Alternatively, the nearest airfield with published METAR can be used for evaluation. In case the nearest station with published METAR data is disproportionately far away, the RPIC will assess the meteorological conditions using other reliable sources, if available, or instruments such as an anemometer and thermometer.

The determined weather data is entered into the technical logbook of the UAS or digitally archived by mail.

e-mail address: GZ@konischeKegel.de

Format / layout of the e-mail:

— Subject line: MET, Flight date,
— In the e-mail: Location of operations and name of the RPIC
— Annex: Data (*.jpg, *.txt, …)

[23] OSO#13

[24] OSO#08, #11, #14, #21_IC1b

[25] OSO#08, #11, #14, #21_IC1a, OSO#23_IC2

2.5 Procedures for responding to unexpected adverse weather conditions[26]

If, despite conscientious flight preparation, an unexpected weather condition raises, impacting the UAS operation:

- It is the RPIC's responsibility not to start a flight that is not yet in progress.
- If the UAS flight is already in progress, the RPIC's first priority is to ensure the safety of all persons involved and he / she shall terminate the operation in the manner that appears at that moment the safest with the least risk to all concerned parties.

2.6 Procedures for TMPR (tactical mitigation performance requirement) [27]

The operation is conducted exclusively within visual range according to VLOS conditions. Therefore, the RPIC will apply the general principle of 'See / Detect and Avoid' in order to reduce the risk of a collision in the airspace.

For early detection of collision hazards, the RPIC shall monitor the surrounding airspace at all times. Any crew member shall point out to the RPIC another aircraft in the airspace if the RPIC has not yet detected it.

It is the responsibility of the RPIC to assess whether the detected aircraft (UAS or manned) already poses a hazard or may become a hazard if there is an indication that it may enter the area of operations. It is his / her responsibility to decide this in time and, if necessary, to refer to the appropriate procedures.

See the contingency procedures in:

- paragraph 2.8.3.4 'Appearance of an uninvolved UAS' or
- paragraph 2.8.3.5 'Appearance of a manned aircraft'.

2.7 Occurrence reporting[28]

2.7.1 What shall be reported?

UAS operators must comply with the provisions of Article 4 of Regulation (EU) No 376/2014 with the modifications presented in Article 136 of Regulation (EU) 2018/1139:

- every safety-related occurrence that endangers or, in the absence of countermeasures and / or in the event of non-compliance, would endanger an aircraft, its occupants, other persons, equipment or installations associated with the operation of aircraft;
- other relevant safety-related information.

These include among other things:

- accidents or serious incidents;
- a serious or fatal injury to persons;
- when a manned aircraft is involved;
- damage to property; and
- all other cases defined in the operational authorisation.

[26] **OSO#08, #11, #14, #21_IC1a**

[27] **TMPR without technology - VLOS**

[28] **OSO#08, #11, #14, #21_IC1a**

2.7.2 Who reports?

The RPIC is responsible for reporting immediately after an occurrence happens except when there are exceptional circumstances that prevent this. In this case, it shall be reported within 72 hours. If the RPIC is unable to report the incident, another person immediately following in rank and involved in the operation shall take over.

2.7.3 To whom / How shall reports be made?

Reports are made in accordance with Regulation (EU) No 376/2014, using the following website.

https://aviationreporting.eu/

In case of accidents or serious incidents (e.g. in case of a serious or fatal injury or a manned aircraft is involved), the RPIC shall immediately report in accordance with Regulation (EU) No 996/2010 to the AAIB (Aircraft Accident Investigation Bureau). This can be done:

- by telephone, +4912345678
- by FAX, +4912345666
- via email mail@mail.com
- using the online form available at www.xxx.com.

All persons involved in an emergency should write down their recollections of the incident as soon as possible. The sooner this is done, the better / more accurate the recollections will be. This should be done independently to get as many uninfluenced perspectives and perceptions as possible. The data collected in this way should be supplemented with the journey log, the meteorological data at the time of the incident and any other data that might help to classify the incident.

2.7.4 What shall be observed after reporting?

All occurrence reports should be stored and retained, as the significance of such reports may only become apparent at a later date.

The operator should analyse those events that could have an impact on flight safety in order to identify safety hazards and, if necessary, take appropriate corrective or preventive action. It should forward the preliminary results of its analysis to the competent authority and, in the event that it identifies an actual or potential risk to aviation safety, also the final results of the analysis.

2.8 Procedures specifically designed for UAS 1

2.8.1 Preflight and postflight inspections[29]

Preflight and postflight inspections of the UAS are only carried out by competent persons trained for the specific work. A list of currently qualified persons can be found in the company office for everyone to see.

The remote crew ensures that the UAS is in a safe condition and ready for safe operation in accordance with this OM[30].

This condition is recorded in the UAS technical logbook and confirmed by the signature of the responsible and authorised person[31].

2.8.1.1 Description of the preflight inspection

The preflight inspection will always be carried out using a checklist (see Annex, paragraph 8.3.32), in a 'read and do' style.

The person performing the check will therefore read each item from the checklist and then perform the check. This procedure may also be performed with two persons. One will therefore read the checklist and the other will perform the checks communicating the observation clearly (e.g. with the call out: 'checked').

Completion of the checklist with no open items is documented in the UAS technical logbook with signature.

2.8.1.2 Description of the postflight inspection

The postflight inspection shall always be carried out using a checklist (see Annex, paragraph 8.3.4), in 'a read and do' style.

The person performing the check will therefore read each item from the checklist and then perform the check. This procedure may also be performed with two persons. One will therefore read the checklist and the other will perform the checks communicating the observation clearly (e.g. with the call out: 'checked').

Completion of the checklist with no open items is documented in the UAS technical logbook with signature.

2.8.2 Normal procedures[32]

2.8.2.1 General

A minimum flight altitude of eight metres, which minimises the risk to people, animals and means of transport, will be respected.

2.8.2.2 Take-off

The procedure for take-off shall only be performed after the preflight checklist is completed.

Action:

RPIC:

- check that T/O area is clear;
- **call out: 'CLEAR PROPELLERS!'**;

29 **OSO#07**

30 **OSO#07_IC**

31 **OSO#07_AC1**

32 **OSO#08, #11, #14, #21_IC1a**

- arm motors *(please describe how)*;
- check for initialising;
- check for any errors or un-normal behaviour / sound;
  if so → disarm motors *(please describe how)* and abort procedure.

Action:

RPIC:

- check that initial flight direction is clear;
- check that airspace is clear;
- **call out: 'ATTENTION: START!'**;
- Initiate take-off;
- at safe altitude check if UAS response is normal (as expected);
  if not → land (see paragraph 2.8.2.5) as soon as possible.

As an alternative, a reference to a specific manufacturer instruction/checklist may be provided.

2.8.2.3 Flight

Manual or automatic flight

Action:

RPIC:

- operate the UAS flight control, in case of manual flights;
- monitor:
  - the automatic flight plan is executed as expected (if the UAS has an active automatic flight);
  - the flight parameters of the UAS (e.g. altitude, speed, battery, C2/3-link, …) are as expected.

  In case of deviations → takeover manual control (see paragraph 2.8.2.4)
- observe:
  - weather changes;
  - ground area for presence of uninvolved persons and obstacles;
  - airspace for presence of other aircraft.
    In case of appearance of a:
    → uninvolved UAS, see paragraph 2.8.3.44;
    → manned aircraft, see paragraph 2.8.3.5.

As an alternative, a reference to a specific manufacturer instruction/checklist may be provided.

2.8.2.4 Takeover of manual control

Whenever effectiveness of the automatic control is in doubt or if the RPIC considers necessary, he / she shall take over manual control.

Action:

RPIC:

- switch flight mode to manual control *(please describe how)*;
- check if manual control is established;
- **call out: 'I HAVE CONTROL!'**;
- return to safe altitude and distance.

As an alternative, a reference to a specific manufacturer instruction/checklist may be provided.

2.8.2.5 Land

Action:

RPIC:

- check that the landing area is clear;
- check that the final approach path is clear;
- **call out: 'ATTENTION: LANDING!'**;
- initiate landing;
- as soon as the UAS is safe on ground, disarm motors *(please describe how)*;
- perform postflight checklist (see paragraph 2.8.1.2).

As an alternative, a reference to a specific manufacturer instruction/checklist may be provided.

2.8.3 Contingency procedures[33]

2.8.3.1 Unexpected behaviour of the UAS within the flight geography

As soon as the RPIC detects that the UAS is behaving not as expected, (e.g. deviation from the preprogrammed flight path in automatic mode or incorrect response to the manual inputs), action shall be taken:

RPIC:

- **call out: 'Warning! Warning! Warning!'**;
- in case of automatic flight:
  → take over manual control (see paragraph 2.8.2.4);
  → land (see paragraph 2.8.2.5).

If expectable behaviour can not be restored:

→ terminate the flight (see paragraph 2.8.4.1)

Note : UAS operations can only be resumed once the cause of the fault has been identified, and it has been ensured that it cannot occur again.

2.8.3.2 Contingency manoeuvre in case of lateral exceedance

Please describe the procedure of the contingency manoeuvre. Not the calculations that are part of the SORA documentation.

Should the UA leave the flight geography laterally:
Action:

RPIC:

- in case of automatic flight:
  → takeover manual control (see paragraph 2.8.2.4);
- stop the lateral movement of the UA;
- return UA into the flight geography.

If the UAS cannot be returned to the flight geography or if it is foreseeable that it will leave the contingency volume:

→ terminate the flight (see paragraph 2.8.4.1).

2.8.3.3 Contingency manoeuvre in case of vertical exceedance

Please describe the procedure for the contingency manoeuvre. Not the calculations that are part of the SORA documentation.

Should the UA leave the flight geography vertically:

Action:

RPIC:

- in case of automatic flight:
  → take over manual control (see paragraph 2.8.2.4);
- stop the vertical movement of the UA;
- return UA into the flight geography.

If the UA cannot be returned to the flight geography or if it is foreseeable that it will leave the contingency volume:

→ terminate the flight (see paragraph 2.8.4.1).

[33] OSO#08, #11, #14, #21_IC1a

2.8.3.4 Appearance of an uninvolved UAS

When an uninvolved UAS is detected that is threatening to fly into the flight area or has already entered.

Action:

RPIC:

- **call out: 'Unknown UAS!'**;
- initiate the landing of the UA:
  → land (see paragraph 2.8.2.5).

Note: The UAS operation can only be resumed when it has been ensured that the simultaneous operation of several UAS does not occur again.

2.8.3.5 Appearance of a manned aircraft

When a manned aircraft is observed that is threatening to fly into the operational volume or has already entered.

Action:

RPIC:

- **call out: 'Unknown aircraft!'**;
- initiate the landing of the UA:
  → land (see paragraph 2.8.2.5);
- report the event in accordance with paragraph 2.7.

Note: The UAS operation can only be resumed after it has been ensured that the conflict will not occur again.

2.8.4 Emergency procedures[34]

2.8.4.1 Termination of the flight

When the UA is about to leave the contingency volume limits or whenever the RPIC considers necessary, he / she needs to apply the emergency procedures.

Action:

RPIC:

- verify that there is no person in the area where the UA is expected to impact;
- **call out: 'Crash! Crash! Crash!'**;
- press the kill switch on the UAS;
- note the last position and direction of the UA.

Observer (if present):

- monitor position of the UA and go in a protected area or far from the expected impact zone;
- if necessary, loudly warn other people:
  call out: 'Watch drone crashing and cover! Watch drone crashing and cover!;
- note the last position and direction of the UA.

If the termination procedure was successful, follow the 'crash' procedure (see paragraph 2.8.4.22), otherwise follow 'fly away' procedure (see paragraph **Error! Reference source not found.**3).

2.8.4.2 Crash

After impact:

Action:

RPIC:

- **call Out: 'Crash! Crash! Crash!'**;
- initiation of the **ERP** checklist (see Annex, paragraph 8.3.1).

2.8.4.3 Fly Away

Action:

RPIC:

- **call Out: 'Fly Away! Fly Away! Fly Away!'**;
- initiation of the **ERP** (see Annex, paragraph 8.3.1):
  (Immediately report to ATC or ATM);
- re-attempt the 'flight termination' procedure (see paragraph 2.8.4.1):
  (This can be done permanently in parallel with the ERP, as long as the execution of the ERP is not slowed down or delayed.);
- report the event in accordance with paragraph 2.7.

[34] OSO#08, #11, #14, #21_IC1a

2.9 Procedures specifically designed for UAS 2

If different UAS models are used, the UAS operator shall develop a paragraph with the procedures tailored for each UAS model.

2.9.1 Preflight and postflight inspections

2.9.2 Normal procedures

2.9.3 Contingency procedures

2.9.4 Emergency procedures

3 Flight areas (Part C)

In this Chapter, the limits of the flight area are described. The flight area is made of:

- operational volume: flight geography (where the UAS operation normally takes place) and the contingency volume (where the drone may temporarily fly in abnormal situations);
- ground risk buffer.

3.1 General operational limitations

The operational limits listed here are fixed limits and shall not be exceeded under any circumstances. The listed limits are derived from the operational authorisation issued by the competent authority, consistent with the environmental conditions and technical limits (Part T).

Safe operation can be guaranteed at all times by adhering to the specified operational limits.

The limits defined in this OM will never exceed those defined by the UAS manufacturer and described in the manufacturer instruction[35].

3.1.1 Environmental conditions[36]

3.1.1.1 Light Conditions

The operation only takes place during day time with suitable light conditions in the time between:

- 30 minutes after sunrise; and
- 30 minutes before sunset.

3.1.1.2 Wind

Maximum wind speed ≤ 5 m/s (*please adjust as needed, this value shall not exceed the maximum wind speed defined in the UAS manufacturer instructions)*

3.1.1.3 Visibility

All flights take place under conditions that allows a safe VLOS operations.

The maximum possible 'VLOS distance' between the RPIC and the UA results from the smaller value of ALOS and DLOS and is determined before the flight.

The RPIC will always maintain the UA within the 'VLOS distance'.

Attitude Line of Sight

ALOS = 327 * CD[m] + 20 m

Detection Line of Sight

DLOS = 0.3 * GV[m]

The maximum ground visibility (GV) to be applied is 5000 m.

3.1.1.4 Temperature

The ambient temperature at ground level is between -10°C and +40°C.

Note: Please refer to the limits defined in the UAS manufacturer instructions.

[35] **OSO#23_AC1**

[36] **OSO#23_IC1**

3.1.1.5 Adverse weather conditions

Flights in hail, ice, and precipitation, as well as all weather conditions that are contrary to safe operation, are prohibited.

Note: Please refer to the limits defined in the UAS manufacturer instructions.

3.1.2 Technical operational limitations

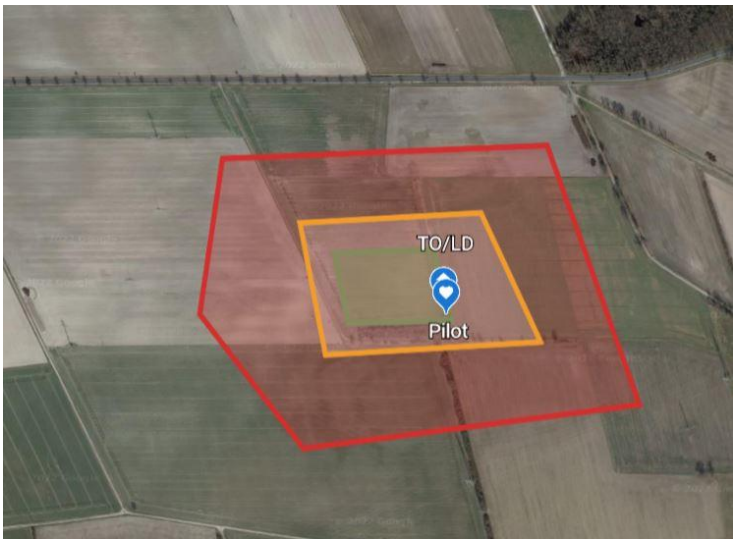
- maximum take-off weight is 12.5 kg;
- maximum speed is 14 m/s (GS - Groundspeed);
- maximum height is 120 m from ground.

Note: Please adapt as needed without exceeding the values defined in the UAS manufacturer instructions.

3.2 Flight area 1

3.2.1 Description

*Please describe where the flight area is located, including the geographical features and provide an image (for example, a screenshot of satellite images or a screenshot of the file *.kml)*



The flight zone with its exact coordinates is clearly defined within the associated file 'Flight_Area_01_R1.kml'.

3.2.2 Calculation of contingency volume and ground risk buffer[37]

Detailed calculation and justification of the values for contingency volume and ground risk buffer

(For example, in accordance with guidelines, otherwise with reasoning and evidence for the chosen values)

The contingency volume is set to xx m laterally an xx m vertically of the flight geography.

The ground risk buffer is set to xx m laterally of the contingency volume.

Note: Please make a reference to the calculation of the contingency volume from the SORA document.

The nomenclature is based on LBA contingency volume / ground risk buffer guidance.

Calculation Contingency Volume

Lateral:

$S_{GPS} = ?$

$S_{Pos} = ?$

$S_K = ?$

$S_{RZ} = ?$

$S_{CM} = ?$ (Which manoeuvre will be used? Reference to procedure!)

$S_{CV} = S_{GPS} + S_{Pos} + S_K + S_{RZ} + S_{CM}$

$S_{CV} = ?$

[37] The calculation of the contingency volume and ground risk buffer is part of the SORA document, where a detailed calculation and justification of the values is provided.

Vertical*:*

$H_{FG} = ?$

$H_{baro} = ?$

$H_{RZ} = ?$

$H_{CM} = ?$

$H_{CV} = H_{FG} + H_{baro} + H_{RZ} + H_{CM}$

$H_{CV} = ?$

Calculation Ground Risk Buffer:

(e.g. with the ballistic approach for multicopter)

$$S_{GRB} = V_0 \sqrt{\frac{2H_{CV}}{g}} + \frac{1}{2}CD$$

$S_{GRB} = ?$

3.2.3 Specific procedures to reduce the ground risk in the flight area

(Only when necessary, even if in the UAS operation used for reference for this OM mitigations are not used, the following examples are provided for reference, so in that case, this paragraph may be deleted).

3.2.3.1 Controlled ground area

Please describe how the 'controlled ground area' is created and maintained to protect the operational area and ground risk buffer.

For example, by means of:

- *survey of the area of operation being free from uninvolved persons;*
- *cautions signs (please describe where they are located);*
- *barriers to prevent uninvolved people to enter in the controlled ground area;*
- *personnel to ensure uninvolved people do not enter the controlled ground area.*

3.2.3.2 M1 mitigation (reduction of number of people at risk)

Please describe how the M1 mitigation is implemented such that the population density at risk, defined in the operational authorisation, is reached providing detailed justification.

3.2.3.3 ARC-Mitigation

Please describe how the air risk mitigation is implemented such that the final ARC, defined in the operational authorisation, is reached.

3.2.3.4 Information to third parties

When operating in a geographical zone, it may be required to inform some third parties such as police, ATC, military, etc..

Please describe the procedure to comply with the requirements defined in the geographical zone or by the third party.

3.2.4 Emergency response plan (ERP) — Local information

Fill the ERP template (please see 8.3.1), using the following numbers:

Telephone number of the nearest airfield:

- Airfield: "Quadratic Field" +49(0)1234 1234567
- Airfield: "Oval Field" Tower controller +49(0)1234 1234576

Air traffic controllers possibly affected (ATM):

- Bremen +49(0)1234 xxxxxxx
- Langen +49(0)1234 xxxxxxx
- München +49(0)1234 xxxxxxx

Nearest fire station:

- Fire Department 112
- Alternative +49(0)1234 xxxxxxx

Nearest police station:

- Police 110
- Alternative +49(0)1234 xxxxxxxx

3.3 Flight area 2

Only when necessary

3.3.1 Description

3.3.2 Calculation of contingency volume and ground risk buffer

3.3.3 Specific procedures to reduce the ground risk in the flight area

3.3.4 Emergency response plan (ERP) — Local information

3.4 Flight area 3

Only when necessary

Etc.

4 Training (Part D)[38]

Training of all personnel takes place in accordance with the company training manual (Part D) that is available for consultation in the company office. It complies with all the requirements of Commission Implementing Regulation (EU) 2019/947 and it is regularly updated. It includes, but is not limited to, the following topics:

- applicable laws and regulations for UAS operation in the EU and national special requirements (Commission Implementing Regulation (EU) 2019/947, LuftVO, LuftVG (Air Traffic Act), etc.);
- airspace structures;
- airmanship and aviation safety;
- human performance capacity;
- weather;
- navigation and maps;
- UAS used;
- procedures developed by 'UAS operator name'.

(If necessary, further topics may be added according to the applicable OSOs):

- ERP[39];
- UAS inspection[40];
- MCC (multi-crew cooperation)[41];
- CRM (crew resource management) training[42];
- weather measurement[43].

38 **OSO#01, OSO#08, #11, #14, #21, OSO#09, #15, #22, OSO#16**

39 **M3**

40 **OSO#07**

41 **OSO#16**

42 **OSO#16**

43 **OSO#23_IC3**

5 Emergency response plan – ERP (Part E)[44]

5.1 General

Even though our primary goal is safe UAS operation, accidents and incidents may still occur. It does not matter who is responsible. The first priority is to minimise the effects. In particular, if people have been harmed or could be harmed by the consequences of an emergency, the following applies:

People First, Then Property!

In addition, the general principles shall apply to all persons involved in the operation:

- **stay calm and keep situational awareness;**
- **ensure your own protection;**
- **secure the accident site;**
- **help people to go away from the danger zone;**
- **give first aid;**
- **report the emergency to authorities.**

Each person does what he or / she can, without putting himself / herself in danger.

5.2 Creation of the ERP

All procedures and check lists described in this Chapter have been designed to the best of our knowledge and belief, taking into account all practical experience gained[45].

The objective is to make these procedures clear, understandable and applicable, and at the same time minimise the impact of human error.

The ERP was tested for its suitability with the participation of all office holders, as described in the training manual, by means of a detailed 'table-top exercise' and was considered acceptable[46].

In the process, the ERP was checked to ensure that it[47]:

- is appropriate for the situation;
- limits the consequential effects;
- contains definitions that allow the identification of emergencies;
- is practically feasible; and
- clearly identifies the responsibilities of all parties involved.

44 **M3 – Medium**

45 **M3_AC1a**

46 **M3_AC1b**

47 **M3_IC**

5.3 ERP checklist template

The ERP checklist template (see Annex, paragraph 8.3.1) summarises the emergency procedure and it is generally used for ease of use and to facilitate action by the people involved on site in case of an emergency.

The ERP checklist shall be completed and signed by the emergency response manager[48] (PIC) before starting a UAS operation. For documentation purposes, the ERP template is photographed before the start of operation and sent to the company office by e-mail.

The e-mail address of the company office is: GZ@konischeKegel.de

Format / layout of the e-mail:

- subject line: ERP, flight date;
- in the e-mail: Location of operations and name of the PIC;
- annex: Data (*.jpg).

5.4 Preparation and briefing

Before the first flight of the day, the RPIC conduct the briefing (see paragraph 2.1) showing the ERP checklist (filled for the flight location) to all involved persons and, in the event of questions, the individual topics are dealt with. Only when all questions about the ERP have been clarified, the operation can be started. When the flight location or any condition affecting safety is changed the briefing shall be repeated.

The ERP distinguishes between two types of emergencies:

1. **Emergencies where the effects on the ground after a crash shall be limited**
   In order to be able to react appropriately and promptly to these emergencies, the following is recorded in the ERP checklist before starting the flight:
   a. nearest location of first aid materials (‘first aid kit’, etc.);
   b. nearest location of fire extinguishing equipment (fire extinguishers, etc.);
   c. telephone numbers for further emergency services, in case the emergency cannot be brought under control using own resources.

2. **Emergencies requiring notification to an ATM provider or airfield / airport**
   In order to be able to react appropriately and promptly to these emergencies, the following is recorded in the ERP checklist prior to the operation:
   a. telephone numbers of any airfields / airports affected. For airfields / airports with control zones, the direct extension number of the tower controllers;
   b. telephone number of the nearest ATM provider.

Location-specific information or telephone numbers are listed in paragraph 3.2.4. Further known reporting channels and contact details are provided there as an aid.

[48] Depending on the structure of the organisation, it may be the safety manager or the flight operations manager or the accountable manager.

5.5 Reporting procedures and obligations after an emergency situation[49]

Any triggering of the ERP should be processed in the best possible way to improve the safety of the UAS operation.

All persons involved in an emergency should write down their recollections of the incident as soon as possible and provide them to the safety manager. The sooner this is done, the better and more accurate the recollections will be. This should be done independently, to get as many uninfluenced perspectives and perceptions as possible.

See also paragraph 2.7 ‘Occurrence Reporting’.

[49] **OSO#08, #11, #14, #21_IC1a8**

6 Technical Part of UAS (Part T)

In this Chapter, all necessary details of the UAS used are described in detail.

Note: If the information is present in the UAS manufacturer instructions, this Chapter may be replaced by a reference to it or only contain the missing information. An example is provided below:

6.1 UAS 1 [Model/Type]

6.1.1 Description

The UAS 1 is a multi-rotor manufactured by XXXX.

It is designed as a fully symmetrical cross with 4 rotors. The characteristic dimension of the UAS is 1.5 m, measured from rotor tip to rotor tip.

The UAS is electrically powered with a nominal voltage of 22.2 V.

The power supply is provided by the use of a lithium-polymer accumulator (6S1P) with a capacity of 5000 mAh.

Nominal voltage of the accumulator	22.2 V
Capacity of the accumulator	5000 mAh
Maximum take-off weight	12.5 kg
Empty weight	9 kg
Characteristic Dimension (CD)	1,5 m
Other ….	

6.1.2 Image / graphic

Illustration 1: UAS 1 in Configuration xy

The figure (Ill. 1) shows UAS 1 in the configuration xy standing on the ground ready for operation.

6.1.3 C3 Link[50]

(Please describe the used C3-Link in terms of performance, quality, RF spectrum and environmental conditions in order to safely perform the planned operation at all times[51].)

All C3 links used provide sufficient information for the pilot to monitor at all times whether operational requirements are being met[52].

6.1.4 Parachute (M2)

A parachute is not installed and not used in this example.

If required:

- *detailed description of the system;*
- *evidence for adequate functionality.*

6.1.5 TMPR

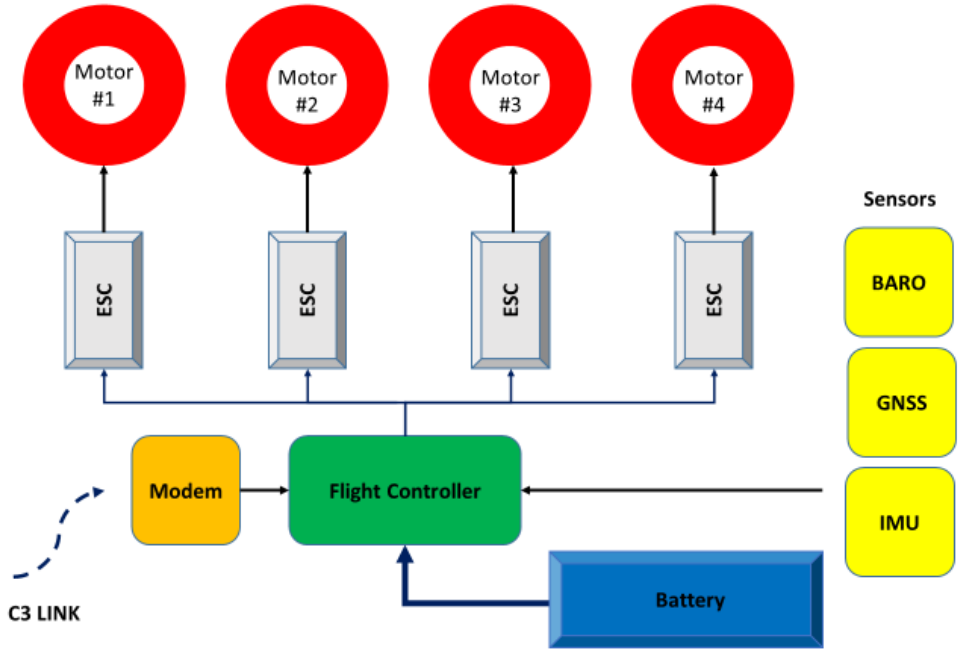
- Not necessary in this example, as unused.

If required, describe the technical feature meting the TMPR.

6.1.6 Containment[53]

6.1.6.1 System

Schematic representation of the containment system:



50 OSO#06

51 OSO#06_ICa

52 OSO#06_ICb

53 SORA Step 9

Schematic representation of the command unit, highlighting the position of the button initiating the flight termination system (or if separate from the command unit, picture of such system):

Picture of flight termination switch on the command unit

Leaving the operating volume can be prevented at any time by transmitting the command to switch off all four motors to the flight controller via the FTS button. This can be done, for example, within the framework of the procedure 'Termination of the Flight' (see paragraph 2.8.4.1).

No probable failure of the UAS or any external system can cause the UAS to leave the operating volume.

6.1.6.2 Enhanced Containment

(SORA Step 9 Enhanced Containment)

- Not necessary in this example, as unused.

- *Only If required:*

  As shown graphically in the overview in paragraph 6.1.6.1, two completely independent systems can be used for flight termination to prevent the leaving of the operating volume. (Attention: Currently, only containment is shown in 6.1.6.1!).

  1. *the main system used for regular control of the UAS; and*
  2. *the flight termination system with a separate C2 link with the sole task of acting as a fallback in the event of the failure of the main system.*

  Both systems can be activated independently of each other by the remote pilot.

  By using commercially available system solutions, a failure probability of the individual systems of $1x10^{-2}$/flight hour is assumed.

  -Reference to the systems-

  Since two independent systems are used here, the total probability of failure is calculated as follows:

  $1x10^{-2}*1x10^{-2}=1x10^{-4}$

  Since leaving the operating volume is only possible through the simultaneous failure / breakdown of both systems, the requirement is fulfilled.

  If the UAS is in danger of leaving the operating volume, the PIC initiates the flight termination in accordance with Chapter xxx.

  We thus assure that all the requirements for 'enhanced containment' are fully met at all times.

6.1.7 Human-machine interface — HMI (command unit)[54]

(Please describe the used HMI on the command unit, providing a picture with a description of the functionality of each button).

The objectives of the UAS human-machine interfaces are to:

- present data and information clearly and concisely;
- avoid confusion;
- prevent disproportionate fatigue; and

[54] OSO#20

- minimise errors by the crew.

All human-machine interfaces have been tested during flights under safe conditions in the open category. Analysis of the test flights, taking into account human factors, has shown that all human-machine interfaces are adequate and suitable for the planned operation.

6.1.8 Payload

Not necessary in this example, as unused.

(Please describe the payload used and how to operate it. If a special training to operate the payload is needed, please provide information in Part D).

6.1.9 Designed and qualified for adverse environmental conditions

(Please list the environmental limits at which the UAS can be operated (e.g. max wind, max temperature, rain, hail, ice conditions).

6.2 UAS 2 [Model/Type]

Only if required.

6.2.1 Description

6.2.2 Image / graphic

6.2.3 C3 Link

6.2.4 Parachute (M2)

6.2.5 TMPR

6.2.6 Containment

6.2.7 Human-machine interface — HMI

6.2.8 Payload

6.2.9 Designed and qualified for adverse environmental conditions

7 Maintenance (Part M)[55]

7.1 General

Maintenance actions ensure that the UAS is in a safe operating condition at all times and that a hazard due to wear and tear, signs of use or ageing of the technology can be excluded.

The UAS is regularly maintained according to the maintenance manual (see Annex, paragraph 8.4.1). The maintenance intervals laid out by the manufacturer are to be considered as a maximum. All maintenance will therefore be scheduled in advance in a way that a positive time margin remains to these maximum values.

All maintenance actions are carried out only by competent persons trained for the specific work. A list of currently qualified and authorised persons can be found in the company office.[56]

Maintenance actions may only be carried out in accordance with the maintenance instructions described herein.

All maintenance actions carried out on the UAS are recorded in the technical logbook (see paragraph 8.2.6), together with the person carrying out the maintenance and the work done[57].

7.2 Software Updates

After each software update of the UAS, test flights shall first be carried out in an area compatible with subcategory A3 of the open category, and all important functions shall be checked.

These flights with their results are documented in the technical logbook.

7.3 Maintenance UAS 1 **[Model/Type]**

Please describe the maintenance interval and the instructions or refer to the chapter of the UAS manufacturer manual where they are listed[58].

7.4 Maintenance UAS 2 **[Model/Type]**

See above, as required.

55 **OSO#01, OSO#03**

56 **OSO#03_ICb**

57 **OSO#03_AC1b**

58 **OSO#03_ICc**

8 Annex

8.1 Evidences

8.1.1 Organisational

8.1.1.1 Organisational Operating Certificate

Not required in this example.

8.1.1.2 Maintenance Program / Organisation Certificate

Not required in this example.

8.1.2 Operational

8.1.2.1 Operational Agreement with ATC[59]

- Not required in this example;
- If required:

The operating agreement with the airfield 'Quadratic Field' follows on the next page.

-DOCUMENT- (Separate operating agreement, signed by the responsible parties)

8.1.2.2 M1 ground mitigation[60]

Not required in this example.

8.1.2.3 Flight Tests

Evidence of flight tests for contingency and emergency procedures[61]

Documentation of the flight tests carried out in an area compatible with subcategory A3 of the open category.

Date	Flight Tests	Type	Number	Result
01.04.2022	2.8.3.1	Simulated	3	3/3 successful
01.04.2022	2.8.3.3	Real	5	5/5 successful
to be completed				

8.1.2.4 Performance of external services and systems[62]

Not required in this example.

[59] In case the operation is conducted close to an airport.

[60] Evidence that the population density at risk is reduced.

[61] **OSO#08, #11, #14, #21**

[62] **OSO#013**

8.1.3 Technical evidence of the UAS

8.1.3.1 Design (DVR, TC)

- Not required in this example;
- Please provide the number of the DVR or TC.

8.1.3.2 M2 ground mitigation

- Not required in this example;
- Please describe it.

8.1.3.3 Manufacturer Competence

Not required in this example.

8.2 Printed forms

8.2.1 List of personnel authorised to perform maintenance on the UAS[63]

The template to be printed out is on the next page.

[63] OSO#03_AC1c

Maintenance Personnel:

The following persons are authorised to carry out maintenance activities:

Name	UAS model	Type of authorisation	Authorised since [date]	Authorised until [date]

8.2.2 List of personnel authorised to conduct preflight and postflight inspections[64]

The template to be printed out is on the next page.

64 OSO#07_AC2

Personnel authorised to conduct preflight and postflight inspections:

The following persons are authorised to carry out preflight and postflight inspections:

Name	UAS model	Authorised since [date]	Authorised until [date]

8.2.3 List for the training / experience level of the personnel[65]

The template to be printed out is on the next page.

65 OSO#03_AC2

Qualifications, experience and training of the personnel

For each personnel employed by the UAS operator, the following spreadsheet should be filled

Name: _____ Function[66]: _____ Qualification[67]: _____ Professional experience[68]: _____		
Required training[69]	Date of completion	If recurrent, expiration date

[66] E.g remote pilot, maintenance personnel, observer etc..

[67] E.g. study, apprenticeship, licence(s), etc..

[68] E.g. flying hours.

[69] Please add all the training courses identified in Part D for that function.

8.2.4 List for authorised remote pilots

The template to be printed out is on the next page.

List of authorised remote pilots

The following people are authorised to fly within the scope of this OM:

Name	UAS model	Authorised since [date]	Authorised until [date]

8.2.5 List for training on the emergency response plan (ERP)[70]

The template to be printed out is on the next page.

[70] M3_C2b

List for training on the emergency response plan (ERP)

The following persons have participated in the emergency response plan training:

Name	Date of the training	Name / signature of a person authorised to provide training

8.2.6 Technical logbook[71]

The template to be printed out is on the next page.

[71] OSO#03_AC1b, OSO#07_AC1

Technical logbook

UAS Model _____ UAS serial No.: _____ Page: _____

Date: _____ (dd.mm.yy)	Pre-light checklist completed by: _____ Postflight checklist completed by: _____		Number of flights[72]: __	Start time[73]: _____ End time[74]: _____ Flight time[75]: _____ (hh:mm)	Total FH[76]: _____ (hh:mm)
Location[77]		Weather conditions[78]			
Defect / occurrence Description		Action taken (maintenance)			
RPIC: Name / signature _____			Released by: Name / signature _____		

[72] In case multiple flights are conducted on the same day, in the same conditions, in the same location, they may be logged on the same sheet.

[73] First flight related to this page.

[74] Last flight related to this page.

[75] Hh:mm for this flight.

[76] Total FH accumulated since the first time the UAS has been used.

[77] In case take-off and landing locations are different, please specify both.

[78] Indicate wind speed, precipitations, visibility and temperature.

8.3 Check lists

8.3.1 ERP check list template

The ERP template can be found on the next three pages.

Emergency Response Plan

For every flight high-visibility jackets for all persons involved, a first-aid kit in accordance with DIN 13157 and a fire extinguisher in accordance with DIN EN 3 shall be available.

- Location of the high-visibility jackets: _____
- Location of the first-aid kit and expiration date: _____
- Location of the fire extinguisher and expiration date: _____

Emergency plan in the event of a UA crash

Name and telephone number of the nearest fire station: _____[79]

Name and telephone number of the nearest police station: _____[75]

RULES FOR ALL INVOLVED PERSONS IN THE AREA OF THE ACCIDENT

- **Stay calm**
- **Rescue of people before rescue of objects**

1. **HAVE SITUATION AWARENESS**
   - Wear the high-visibility jackets
   - Go to the scene of the accident as quickly as possible
   - Secure the scene of the accident
   - Ensure own protection

2. **If people are impacted by the UAS: RESCUE them**
   - Rescue people from the danger zone
   - Keep a safe distance from the scene of the accident
   - Ensure own protection

3. **If necessary: MAKE AN EMERGENCY CALL Tel.: 112 or the number listed above**
   - Provide the name of the UAS operator and your name
   - Where did it happen?
   - What has happened?
   - How many people are injured?
   - Answer to any question!

4. **If necessary: EXTINGUISH FIRE**
   - Do not put yourself in danger
   - Fight fire (using a fire extinguisher or a fire blanket)
   - Take special care with rechargeable batteries! Explosion hazard!
   - Brief the arriving fire service

5. **If necessary: PROVIDE FIRST AID**
   - Check injured people for signs of life
   - Resuscitate in the event of circulatory arrest
   - Staunch any bleeding
   - Place injured people in the recovery position

[79] Use the number identified in paragraph 3.2.4

- Brief the rescue service

Emergency plan in the event of the 'Fly Away' of the UAS
The UAS continues to fly despite termination having been initiated

Name and telephone number of the nearest ATM provider: _____[80]

When operating near an airfield / airport:

Name and telephone number of the airfield / airport (Tower): _____[76]

RULES

- **Keep calm**
- **Rescue of people before rescue of objects**

1. IN CASE OF C2 LINK LOSS

- Repeat the connection attempt several times
- Change the position of the remote control or antenna on the ground (if possible)

2. INFORM the airport / airfield in the vicinity

- Report by telephone the fly-away to the above-mentioned tower
  - Provide the name of the UAS operator and your name
  - Where did it happen?
  - What has happened?
  - Size, configuration and cruise speed of the UAS
  - Last known direction of flight
  - Estimated maximum possible flight time
  - Estimated maximum achievable flight altitude
  - Answer to any question!

3. INFORM the ATM PROVIDER

- Telephone report of the fly-away to the above-mentioned ATM provider
  - Who is reporting?
  - Where did it happen?
  - What has happened?
  - Size and configuration of the UAS
  - Last known direction of flight
  - Estimated maximum possible flight time and distance until battery will be depleted
  - Estimated maximum achievable flight altitude
  - Wait for any questions!

- **INFORM the POLICE Tel.: 112 or the number listed above**
- Telephone report of the fly-away and warning about a possible crash
  - Provide the name of the UAS operator and your name
  - Where did it happen?
  - What has happened?
  - Size and configuration of the UAS

[80] Use the number identified in paragraph 3.2.4

- Last known direction of flight
- Estimated maximum possible flight time and distance until battery will be depleted
- Answer to any question!

REPORT AN ACCIDENT

Within 72 hours, report the accident to the aircraft accident investigation authority of the state where the operation takes place, in the event of:

- Accidents or serious incidents
- Damage to property
- A severe or fatal injury
- A manned aircraft is involved ;or
- All other cases defined in the operational authorisation.

Place, Date, Signature (RPIC): _____

For the instructions on how to report an accident, please see paragraph 2.7 of the OM

8.3.3 Preflight inspection — Check list

The template to be printed out is on the next page.

Preflight checklist:

Note:

- all items have to be checked before any flight operation;
- completion of this list has to be signed in the technical logbook.

Please adjust to your needs!

Equipment / crew	
	Personnel fit for operation
	All equipment needed for the UAS operation are available and complete
	Documents available (e.g. operational authorisation, flight authorisation in case of entering a geographical zone, insurance, pilot certificate etc.)
	ERP checklist filled for the flight location is available
Flight planning	
	Geographical zones applicable to the flight area checked
	Weather information gained, forecast for the duration of the flight are within UAS limits
	Mission planning completed (e.g. home point set)
	Briefing to all involved persons completed
UAS	
	No open defects in technical logbook
	Inspection of the UAS completed (e.g. no visible damage, fully assembled and in the correct configuration, all motors turn easily and freely)
	Batteries of UA and CU charged
	Correct flight plan loaded (if applicable)
	Geo-awareness and geofencing uploaded (if applicable)
Take-off area	
	Flat area
	Check wind direction
	No obstacles in departure or arrival area

8.3.4 Postflight inspection — Check list

The template to be printed out is on the next page.

Postflight checklist:

Note:

- all items have to be checked after any flight operation;
- completion of this list has to be signed in the technical logbook.

Pleas adjust to your needs!

UA	
	UA secured
	Batteries disconnected
	Inspection of the UAS completed (e.g. no visible damage)
Documentation	
	Flight times logged in technical logbook
	Defects or occurrences (e.g. hard landing) entry in technical logbook

8.4 Manuals

8.4.1 Maintenance manual

Include maintenance manual of the manufacturer, if applicable and referenced.