European Union Aviation Safety Agency

Notice of Proposed Amendment 2021-09

in accordance with Articles 6(3), 7 and 8 (Standard procedure: public consultation) of MB Decision No 18-2015

Regular update of the acceptable means of compliance and guidance material to Regulation (EU) 2019/947 on the rules and procedures for the operation of unmanned aircraft

RMT.0730

EXECUTIVE SUMMARY

The objective of this Notice of Proposed Amendment (NPA) is to maintain a high level of safety for unmanned aircraft system (UAS) operations in the 'open' and 'specific' categories.

This NPA proposes to amend some of the existing, and introduce new, acceptable means of compliance (AMC) and guidance material (GM) to Regulation (EU) 2019/947 on the rules and procedures for the operation of UASs, as follows:

— new AMC and GM for the definition of 'geographical zones';

— revised forms for the application and issue of operational authorisations in the 'specific' category;

— new AMC defining the procedure to be applied by UAS operators and the competent authorities for cross-border operations, including the related forms;

— new AMC and GM for the standard scenarios (STSs);

— new AMC to comply with the mitigations requirements and meet the operational safety objectives (OSOs) that are defined in the specific operations risk assessment (SORA);

— new AMC that provide the syllabus for training modules for remote pilots that operate in the 'specific' category; and

— revision of the AMC following feedback received from national aviation authorities (NAAs) and UAS operators.

In particular, the AMC and GM for the geographical zones are the outcome of the UAS Geographical Zones Task Force (TF) which was established based on the input of the MAB providing procedures and guidelines for Member States (MSs) to create zones in order to protect areas where the safety, security or privacy risk is higher.

Both the amended and the new AMC and GM are expected to maintain safety as regards UAS operations in the 'open' and 'specific' categories, and increase the harmonisation of UAS operations across the European Union by providing a consistent and correct interpretation of the regulatory material.

Domain:	UAS		
Related rules:	AMC and GM to Regulation (EU) 2019/947 ('UAS Regulation') and to Part-UAS thereof		
Affected stakeholders:	UAS operators (private and commercial); competent authorities; EASA; remote pilots; UAS manufacturers; other airspace users (manned aircraft); general public		
Driver:	Safety	**Rulemaking group:**	No
Impact assessment:	No	**Rulemaking Procedure:**	Standard

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1. About this NPA

1.1. How this NPA was developed

The European Union Aviation Safety Agency (EASA) developed this Notice of Proposed Amendment (NPA) in line with Regulation (EU) 2018/1139[1] (the 'Basic Regulation') and the Rulemaking Procedure[2]. Rulemaking task (RMT).0730 is included in the European Plan for Aviation Safety (EPAS) 2021–2025. The scope and timescales of this RMT were defined in the related Terms of Reference[3].

This NPA proposes to amend some of the existing acceptable means of compliance (AMC) and guidance material (GM) to Regulation (EU) 2019/947 (the 'UAS Regulation')[4] and to the Annex (Part-UAS) thereto, and to introduce new AMC and GM.

EASA developed most of the proposed amendments and some of the new AMC and GM based on the feedback received from the EASA Member States (MSs) and stakeholders since the publication of Decision 2019/021/R[5], which amended the AMC and GM to the UAS Regulation and to Part-UAS thereof.

EASA developed the AMC and GM to Articles 15 and 19 of the UAS Regulation based on the input of the *UAS Geographical Zones Task Force*. This Task Force was created to timely develop this regulatory material to facilitate the harmonised implementation of Article 15 on 'operational conditions for UAS geographical zones'. The Task Force is composed of nominated members from the Member States' Advisory Body Strategy Group (MAB SG), EUROCONTROL and the European Defence Agency (EDA), and is chaired by EASA.

EASA developed new AMC and GM for standard scenarios STS-01 and STS-02 (which were introduced with Regulation (EU) 2020/639[6]) based on:

— the comments submitted during the consultation on these STSs; and

— the feedback received after their publication.

The NPA is hereby submitted to all interested parties for consultation in accordance with Article 115 of the Basic Regulation, and Articles 6(3), 7 and 8 of the Rulemaking Procedure.

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1 Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91 (OJ L 212, 22.8.2018, p. 1) (https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1535612134845&uri=CELEX:32018R1139).

2 EASA is bound to follow a structured rulemaking process as required by Article 115(1) of Regulation (EU) 2018/1139. Such a process has been adopted by the EASA Management Board (MB) and is referred to as the 'Rulemaking Procedure'. See MB Decision No 18-2015 of 15 December 2015 replacing Decision 01/2012 concerning the procedure to be applied by EASA for the issuing of opinions, certification specifications and guidance material (http://www.easa.europa.eu/the-agency/management-board/decisions/easa-mb-decision-18-2015-rulemaking-procedure).

3 https://www.easa.europa.eu/document-library/terms-of-reference-and-group-compositions/tor-rmt0730

4 Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft (OJ L 152, 11.6.2019, p. 45) (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R0947&qid=1621949683926).

5 https://www.easa.europa.eu/document-library/agency-decisions/ed-decision-2019021r

6 Commission Implementing Regulation (EU) 2020/639 of 12 May 2020 amending Implementing Regulation (EU) 2019/947 as regards standard scenarios for operations executed in or beyond the visual line of sight (OJ L 150, 13.5.2020, p. 1) (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32020R0639&qid=1621954342701).

The major milestones of this RMT are presented on the cover page.

1.2. How to comment on this NPA

Please submit your comments using the automated **Comment-Response Tool (CRT)** available at **http://hub.easa.europa.eu/crt/**[7].

The deadline for the submission of comments is **15 September 2021**.

1.3. The next steps

Following the public consultation, EASA will review all the comments received. Based on those comments, EASA will issue a decision to amend the related AMC and GM to the UAS Regulation and to Part-UAS thereof.

The individual comments received on this NPA and the EASA responses to them will be reflected in a comment-response document (CRD), which will be published on the EASA website[8].

[7] In case of technical problems, please send an email to crt@easa.europa.eu with a short description.

[8] https://www.easa.europa.eu/document-library/comment-response-documents

2. In summary — why and what

2.1. Why we need to amend the rules — issue/rationale

Regulation (EU) 2019/947 (the 'UAS Regulation') lays down harmonised requirements for UAS operations in the 'open' and 'specific' categories across the European Union to foster the development of the EU unmanned aircraft system (UAS) market. The EASA Member States (MSs) are responsible for enforcing that Regulation and for issuing authorisations for operations in the 'specific' category. Annexes I and II to Decision 2019/021/R included the first issues of acceptable means of compliance (AMC) and guidance material (GM) for the implementation of the UAS Regulation, facilitating regulatory harmonisation among the EASA MSs.

However, since the publication of those first issues of AMC and GM, the following developments have taken place, which require to amend some AMC and GM and to introduce new ones:

— Feedback has been received by stakeholders on the forms for the application and issue of the operational authorisation, requesting to update those forms published.

— Stakeholders requested the development of an AMC describing the approval process for cross-border UAS operations, the application form and the form to be used by the competent authority for confirmation that the operation may take place.

— Regulation (EU) 2020/639 introduced the first two standard scenarios (STSs), for which new AMC and GM need to be developed.

— Two new AMC were introduced for the development of an emergency response plan (ERP) and for the operational procedures with medium and high level of robustness.

— During the adoption process of the UAS Regulation, some EASA Committee members expressed their concern regarding the impact of the implementation of Article 15 on 'operational conditions for UAS geographical zones' and its relationship with the requirements of SERA, the International Civil Aviation Organization (ICAO) Annex 2, as well as with the present aeronautical information management / aeronautical information service (AIM/AIS) regulatory system in the air traffic management / air navigation services (ATM/ANS) domain. Those members requested that the data resolution that is needed for the publication of the UAS geographical zones be clarified, as well as the common vertical reference system that is used for data definition. They also requested to:

  — have a harmonised data format;

  — clarify the applicability of the existing standards of accuracy and quality of aeronautical data; and

  — clarify the contents of the common unique digital format[9] of the UAS geographical zones.

— EASA needs to develop new training modules to be used by UAS operators when defining the competence of remote pilots that operate in the 'specific' category.

[9] As required by Article 15(3): 'When […] Member States define UAS geographical zones, for geo awareness purposes they shall ensure that the information on the UAS geographical zones, including their period of validity, is made publicly available in a common unique digital format.'

— Based on the feedback received from the EASA MSs, some AMC and GM were improved, and new ones introduced, to provide for a uniform interpretation and harmonised implementation of the rules.

2.2. What we want to achieve — objectives

The overall objectives of the EASA system are defined in Article 1 of the Basic Regulation. This proposal will contribute to achieving the overall objectives by addressing the issues described in Section 2.1.

The specific objectives of this proposal are to:

— support the harmonised implementation of the published STSs across the EASA MSs;

— enhance the harmonised application of the specific operations risk assessment (SORA) by introducing appendices with AMC for certain SORA criteria;

— improve some of the AMC and GM and introduce new ones for a consistent and correct interpretation and harmonised implementation of the rules;

— increase safety, efficiency, and harmonisation of the implementation of the UAS Regulation; and

— foster the development of the EU UAS market.

2.3. How we want to achieve it — overview of the proposed amendments

Note to the reader: The presentation of the proposed amendments to the AMC and GM follows the structure of the UAS Regulation.

2.3.1. AMC and GM to 'Definitions'

Definition of 'dangerous goods'

The content of AMC1 Article 2(11) 'Definitions' on the definition of 'dangerous goods' is deemed more appropriate for GM: it clarifies that a blood sample is considered a 'dangerous good' depending on whether it is unchecked, contaminated, or not. Thus, that AMC text is moved to GM1 to Article 2(11), where also a reference was corrected. The AMC part on blood that contains or may contain infectious substances is also moved to GM1 to Article 2(11) as it describes the boundary between the 'specific' and 'certified' categories.

The new content of AMC1 Article 2(11) 'Definitions' indicates that the definition and classification of dangerous goods in the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO Doc 9284) should be considered. In addition, a reference to Advisory Circular (AC) 102-37 (revision 0) that was recently published by ICAO is included in GM1 to Article 2(11) so that further information on the definition provided in Article 2(11) can be obtained without having to purchase ICAO Doc 9284.

Lastly, a new AMC to Article 5 is introduced to specify the conditions for the carriage of dangerous goods by UASs that are operated in the 'specific' category.

Definition of 'uninvolved persons'

GM1 to Article 2(18) 'Definitions' is clarified to indicate that a person can be considered 'involved' in a UAS operation if they:

— are not engaged in other activities;

— give their explicit consent to the UAS operator or to the remote pilot to being part of that operation; and

— have received clear instructions and taken safety precautions.

The person should at any point in time be able to monitor the position of the unmanned aircraft (UA) and to take action to avoid being hit in case of loss of control of the UA. In addition, some editorial corrections were made in said GM.

Definition of 'controlled ground area', 'operational volume', and other related definitions

Following discussions with stakeholders on the draft STSs, GM1 Article 2(21), (28), (29), (31), (32), and (33) 'Definitions' is introduced to clarify the relations between 'flight geography', 'flight geography area', 'contingency area', 'operational volume', 'ground risk buffer', and 'controlled ground area'. These definitions are applicable to all UAS operations in the 'specific' category.

Definition of 'airspace observer'

Appendix A to AMC2 Article 11 lists the responsibilities of the airspace observers (AOs). Since these responsibilities are applicable every time AOs are employed and are not peculiar to predefined risk assessments (PDRAs), that Appendix is deleted and GM is introduced to explain that the responsibilities of the AOs are defined in point UAS.STS-02.050 of the UAS Regulation.

2.3.2. AMC to Article 11 — 'Specific operations risk assessment (SORA)'

In March 2021, EASA published on its website the 'Guidelines on Design verification of UAS operated in the 'specific' category and classified in SAIL III and IV', Issue 1[10]. According to this document, the NAA may require the operator intending to conduct an operation in the medium risk of the 'specific' category to use a drone with a design verification report issued by EASA. Point 1.5 of the SORA has been, therefore, updated to reflect the content of the guidelines.

According to point 2.5.3 (Step #9) of the SORA, a design and installation appraisal is required to verify that no probable failure of the UAS or any external system that supports the operation may lead to operations outside the operational volume, even when the adjacent areas do not contain assemblies of people or airspace classified as air risk class (ARC)-d. This approach is not consistent with the level of assurance that is required for similar low-risk situations, where a declaration of the UAS operator or the UAS manufacturer is allowed. This point is, therefore, amended to allow the UAS manufacturer to declare compliance with such requirement.

The list of PDRAs in Table 2 of GM1 to the SORA is slightly modified to reflect the extension of the applicability of PDRA-G02 to restricted airspace. Moreover, it is clarified that the definition of 'populated area', as used throughout the AMC to the SORA, should be understood as the definition of

[10] https://www.easa.europa.eu/sites/default/files/dfu/guidelines_design_verification_uas_medium_risk.pdf

'congested area' in Regulation (EU) No 965/2012 (the 'Air Operations Regulation') and of 'rural area', which are all the areas outside an airport environment.

Annexes B and E to AMC1 to Article 11 — 'Specific operations risk assessment (SORA)'

Annexes B and E to AMC1 to the SORA are modified to specify which authority is responsible for the verification. According to Regulation (EU) 1139/2018 (the 'Basic Regulation'), the EASA MSs are competent for assessing the operational and pilot competency requirements, while the EU, via EASA, is competent for assessing the design requirements. Moreover, said Annexes now clarify the possibility to use a designated entity that is allowed to issue certificates on behalf of the competent authority.

In order to harmonise the criteria for the development of an ERP across the MSs, EASA introduces AMC3 UAS.SPEC.030(3)(e), which addresses the main aspects of an ERP with a medium level of robustness.

The scope of said AMC includes the protection of personnel involved in the operations, and not only third parties.

In particular:

— The overall purpose of the ERP is harmonised with that indicated for non-complex operators in the Air Operations Regulation[11] and complemented with specific aspects included in the SORA; and

— Some key aspects are based on guidance material on ERP, which was developed by the MSs' competent authorities and recognised organisations. For example:

  — the main aspects to be considered for an effective ERP are based on those indicated in FOCA GM/INFO 'Certification Leaflet Management System'[12];

  — the minimum aspects to be addressed by procedures in the ERP are based on those included in the section 'Emergency response planning' of the CAA UK safety management system guidance for small, non-complex organisations[13]; and

  — guidance for a number of aspects is provided in the European Helicopter Safety Team (EHEST) *Safety Management Toolkit for Non-Complex Operators*[14].

The validation of the ERP through tabletop exercises is not necessary if the UAS operator is a one-person organisation and does not manage external personnel in an emergency response.

Annex C to AMC1 to Article 11 'STRATEGIC MITIGATION — COLLISION RISK ASSESSMENT'

The very low level threshold value that is used in points C.3.3, C.6.2, and C.6.3 of Annex C to the SORA is up to 400 ft above ground level (AGL). This threshold value is different from the original one of 500 ft

[11] Point ORO.GEN.200(a) of Regulation (EU) No 965/2012.

[12] https://www.bazl.admin.ch/dam/bazl/en/dokumente/Fachleute/flugoperationen/gm-info/CL_MS.pdf.download.pdf/20150428_FOCA_CL_Management_System_PDF.pdf

[13] CAP 1059 – *Safety Management Systems: Guidance for small, non-complex organisations*, UK CAA, June 2013 (http://publicapps.caa.co.uk/docs/33/CAP%201059%20SMS%20for%20small%20organisations%20(p).pdf).

[14] EHEST *Safety Management Toolkit for Non-Complex Operators — Emergency Response Plan — A Template for Industry*, EHEST, 2nd edition, October 2014 (https://www.easa.europa.eu/sites/default/files/dfu/EHEST-SMM-NC-Toolkit-v2-2014.zip).

AGL that is proposed in the Joint Authorities for Rulemaking on Unmanned Systems (JARUS) SORA. The reason for introducing this change during the development of the 'European SORA' was to make it consistent with the 120-m (400-ft) value, which is defined for the 'open' category. However, the threshold value that is defined in Annex C to the SORA refers to the operational volume, whereas the height value in the 'open' category refers to the flight geography and a risk buffer of 30 m was used. Therefore, Annex C should refer to the maximum operational volume (i.e. height of 500 ft AGL) and allow the operator to propose to the competent authority a risk buffer value appropriate for its operation. For this reason, the original threshold of 500 ft should be used in Annex C.

Annex E to AMC1 to Article 11 (SORA) — OSOs #08, #11, #14, and #21

OSO #02 provides the requirements for manufacturers, encompassing design and production. Considering the partition of competence between the MSs and the EU (through EASA) defined by the Basic Regulation, the OSO has been split in two criteria separating those pertaining to production (within the competence of the MSs) and those pertaining to design (within the competence of the EU). For the high level of robustness, consistently with the approach to require a TC or a RTC issued by EASA, the reference to Subpart G and J has been introduced for production and design organisations respectively.

Q1 — Annex E to AMC1 to Article 11

Stakeholders are invited to express their opinion on the practicability of the requested measures to address OSO #2, and to ensure the respective level of integrity for the production of UASs manufactured in another Member State or in a third country (outside the EASA Member States).

OSOs #08, #11, #14, and #21 are related to operational procedures. One of the criteria for the validation of procedures with a medium level of assurance is that 'operational procedures are validated against standards considered adequate by the competent authority and/or in accordance with a means of compliance acceptable to that authority'.

Thus, to harmonise the criteria for the validation of procedures across the EASA MSs, EASA introduces AMC2 UAS.SPEC.030(3)(e), which addresses the main aspects to be considered in operational procedures with a medium or high level of robustness.

The SORA list of minimum aspects to be addressed by the operational procedures should be supplemented with the more detailed aspects included in the operations manual (OM) template for the 'specific' category (see AMC1 UAS.SPEC.030(3)(e)) and with corresponding guidance (see GM1 UAS.SPEC.030(3)(e)).

The workload of the remote pilot and/or other personnel in charge of duties essential to the UAS operation is a key criterion for evaluating the complexity of the operational procedures to be followed. Therefore, the workload generated by such procedures is one of the main aspects to be proved during the validation of the adequacy of the procedures, and a method for the workload evaluation should be followed. To support this workload evaluation, the 'Bedford Workload Scale'[15] is included in AMC2 UAS.SPEC.030(3)(e) due to its wide use and simplicity. The Bedford Workload Scale is slightly modified to adapt its use in the context of the procedures for UAS operations. The AMC supplements

[15] https://ext.eurocontrol.int/ehp/?q=node/1643#:~:text=The%20Bedford%20Workload%20Scale%20is,reduction%20Rehmann%2C%201995

the guidance of GM1 UAS.SPEC.030(3)(e) with additional information and includes a simple flow diagram for qualitative rating.

The criterion on the consideration of potential human error includes some simple conditions common in guidance material on human factors.

AMC2 UAS.SPEC.030(3)(e) describes the validation process, including the main aspects to be considered for the main steps — review of the procedures' completeness, expert judgement of the adequacy of the procedures, as well as proof of the adequacy of the procedures through tests, simulations, or other methods and their recording. Regarding the use of dedicated flight tests, acceptable means of compliance to be followed are included, based on the experience in the use of such tests in some MSs[16] for proving the adequacy of the procedures in UAS operations.

The criteria for proving the adequacy of the subject OSOs include dedicated flight tests and simulations. However, as a greater degree of flexibility is necessary, a third option is introduced to allow for 'any other means acceptable to the competent authority'. This need for greater flexibility was voiced during the first EASA workshop on STSs in July 2019. The published PDRAs allow for such flexibility. To ensure the adequate implementation of this option, the suitability of those alternative means of compliance should be substantiated. In addition, such substantiation is expected to help share the experience in the use of those alternative means of compliance for operational authorisations in different EASA MSs, thus facilitating also their standardisation.

Lastly, criterion #1 (Procedure definition) of the subject OSOs includes the following note: 'normal, contingency and emergency procedures are compiled in an OM'. However, point UAS.SPEC.030(3) of the UAS Regulation establishes that the application for an operational authorisation shall include an OM when required by the risk and complexity of the operation. Thus, such OM may not be required for all UAS operations under an operational authorisation. Consequently, said note is replaced by a condition for the medium level of assurance, which indicates that 'normal, contingency, and emergency procedures are documented and compiled in an OM'. This means of compliance is consistent with the requirement in the published STSs for UAS operators to develop an OM (STSs have an associated specific assurance and integrity level (SAIL) II, which requires a medium level of robustness for the OSOs that are related to operational procedures).

AMC2, AMC3, AMC4, and AMC 5 to Article 11 — Predefined risk assessments (PDRAs)

The tables providing the PDRA conditions do not include the level of assurance which the operator should use to demonstrate compliance. The PDRAs are the result of the application of the SORA process and they provide compliance with the mitigation measures, OSOs and containment. When the PDRAs were developed, EASA or JARUS published the related risk assessment:

— for the PDRA S-01 and S-02, mirroring the standard scenarios STS-01 and 02, the risk assessment is published in Appendix 1 and 2 respectively to EASA Opinion No 05/2019 'Standard scenarios for UAS operations in the 'specific' category' of 7 November 2019[17].

[16] For example, the *Agencia Estatal de Seguridad Aérea* (AESA), the Spanish Aviation Safety Agency, introduced the JARUS SORA as AMC for the risk assessment that is required by the Spanish Regulation on UAS operations. In addition, it created an AMC that addresses the conduct of flight tests that are required by said Regulation for proving the adequacy of the operational procedures (see Appendix G of the AMC and GM to Royal Decree 1036/2017).

[17] https://www.easa.europa.eu/document-library/opinions/opinion-052019

— PDRA G-01 and G-02 are derived from the JARUS STS-01 and STS-02 respectively that were published on the JARUS website, together with the related risk assessment[18].

All the above PDRAs are for SAIL II operations; therefore, according to the recommended OSOs table, included in SORA Step #8, all OSOs are optional or with a low level of robustness, with the exception of OSO 8 (Operational procedures are defined, validated and adhered to), OSO 11 (Procedures are in place to handle the deterioration of external systems supporting UAS operations), OSO 14 (Operational procedures are defined, validated and adhered to), and OSO 21 (Operational procedures are defined, validated and adhered to). Moreover, for all PDRAs developed so far, it is considered that an emergency response plan (ERP) is developed with a medium level of robustness (mitigation M3 according to SORA Step #3). No additional mitigations are applied; instead, it is considered that enhanced containment should be applied according to SORA Step #9.

All PDRAs are amended to:

— include in the table a column defining the level of robustness the UAS operator should apply when demonstrating compliance with the conditions, and two additional columns that will be filled in by the UAS operator when it will submit the application to the competent authority. All conditions are inked to a low level of assurance with the exception of those related to operational procedures, linked to the OSOs mentioned above with a medium level of robustness, to the ERP, and to the technical requirement of the UAS for the containment;

— include the reference to AMC3 UAS.SPEC.030(3)(e) on the ERP and the validation of the operational procedures (see Section 2.3.2 for the explanation, and Section **Error! Reference source not found.** for the proposed amendment);

— introduce additional conditions on ‘C2 links and communication’, which are included in the PDRA-G03 and PDRA-G04 and are deemed also applicable to PDRA-G01; and

— clarify that also the maintenance conditions supplement the requirements of point UAS.SPEC.050.

PDRA S-01 and S-02 are limited to operations up to 120 m (a 30-m height buffer is applied to the 150-m limit of the operational volume) to speed up the authorisation process by avoiding that the UAS operator is required to justify a different height buffer. However, based on feedback from UAS operators, some EASA MSs requested to include the option to use PDRA S-01 and PDRA S-02 for operations up to 150 m. The following options are, therefore, provided to the UAS operators:

— limit the flight up to 120 m without providing further evidence to the national aviation authority (NAA) (as in the current PDRA); and

— extend the flight up to 150 m; however, in that case, the UAS operator should propose and justify a different height buffer according to the new point added in the ‘Air risk’ section of the PDRAs; moreover, the remote pilot and the AO (when employed in PDRA S-02) should have received additional training, as defined in the relevant sections of the PDRAs.

For PDRA G-01 and G-02, the following amendments are proposed:

[18] http://jarus-rpas.org/sites/jarus-rpas.org/files/jar_doc_6_sora_sts_01_edition1.1.pdf and http://jarus-rpas.org/sites/jarus-rpas.org/files/jar_doc_6_sora_sts_02_edition1.0.pdf

— Some stakeholders consider 'dangerous areas', as part of the reserved airspace, to be within the scope of the PDRA. Indeed, 'dangerous areas' are (together with 'prohibited areas' and 'restricted areas') part of the 'restricted airspace' and not part of the 'reserved airspace'. Furthermore, PDRA G-03, introduced with this NPA, offers the possibility of using airspace that is either reserved or restricted for the purpose of the intended UAS operations. Therefore, PDRA G-02 is amended to include in its scope 'reserved or restricted airspace for UAS operations'.

— This NPA introduces the conditions to not operate the UAS from a moving vehicle and to not hand the control of the UA over to another command unit.

— To make the PDRA conditions exhaustive, the UA should have a unique serial number (SN) and be equipped with a remote identification system, as required by Article 40 of Regulation (EU) 2019/945[19].

2.3.3. Operational authorisation forms and cross-border operations

The application and issuance forms for an operational authorisation are amended to address the feedback received by the stakeholders.

The new forms consider that a UAS operator will submit to the competent authority the operations manual (OM) which will contain most of the required information. It should be noted that the revision of the table of contents of the OM is in progress and it should be made available by EASA on its website in 2022/Q1.

The forms are, therefore, developed to reduce as much as possible their contents to avoid unnecessary administrative burden for UAS operators. However, it has been considered that according to Article 13 of the UAS Regulation, a copy of the operational authorisation must be provided to the competent authority of the MS of operation in case of cross-border operations. In this case, the UAS operator is not required to provide the competent authority of the MS of operation with the full OM but only the chapter(s) describing the operational procedures and relevant information amended by the UAS operator to comply with the local conditions, and after the application of the mitigation measures at the intended location(s). If the UAS operator finds it easier, it can submit to the competent authority of the MS of operation the full OM; this may be the case when the chapters of the OM are interconnected.

Therefore, the operational authorisation form provided in AMC1 Article 13(1) includes all the information that characterises the UAS operation authorised by the competent authority of the MS of registration, and is required by the competent authority of the MS of operation to evaluate the request for a cross-border operation.

AMC1 Article 13 describes the procedure to be followed for applying for a cross-border operation and the documentation the UAS operator needs to submit to the competent authority of the MS of operation.

[19] Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems (OJ L 152, 11.6.2019, p. 1) (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R0945&qid=1622095625570).

AMC1 Article 13(2) and AMC1 UAS.SPEC.040(1) define also the format of the operational authorisation and of the confirmation of acceptability of the cross-border operation.

2.3.4. AMC and GM to Article 15 — Geographical zones

EASA established the 'UAS Geographical Zones Task Force' (the 'Task Force') to develop new AMC and GM on geographical zones. The members of the Task Force extensively discussed the geographical zones aspects, as requested by the EASA MSs. The Task Force reached agreement on many topics but not on all.

AMC1 Article 15(1) 'CROSS-BORDER GEOGRAPHICAL ZONE(S)'

The Task Force discussed about cases where more than one EASA MS decides to establish one or more geographical zones that cross borders and include pieces of airspace of their neighbouring EASA MS(s). For such cases, and as required by Article 15(1) of the UAS Regulation, the Task Force agreed to develop AMC1 Article 15(1) to ensure:

— safety and consistency of data;

— formal coordination among the EASA MSs; and

— that such data on cross-border UAS geographical zones are made available by all affected or involved EASA MSs.

GM1 Article 15(1) 'GENERAL ASPECTS'

The Task Force discussed the process for obtaining data on geographical zones and agreed that GM should be developed to define the approach (see GM1 Article 15(1)).

Geographical zones may be established by the EASA MSs for various reasons, e.g. to protect areas from privacy, security, safety and environmental risks. Therefore, different entities within the EASA MSs may identify the need to define geographical zones (e.g. to protect a prison, critical industrial infrastructure, an aerodrome, government buildings, etc.). The entity concerned may provide details on the geographical zone together with supporting material. To formalise the implementation of geographical zones and ensure the desired level of safety, individual EASA MS arrangements between the originators of the data and the entity processing it must be agreed. Based on those arrangements, the data provided may be validated and, if considered satisfactory, approved and published.

Furthermore, the data on a confirmed geographical zone must be encoded in a common unique digital format and, when processed, the related requirements of the applicable regulations must be met.

If a flight authorisation is required to enter an individual zone, the EASA MS concerned must define the procedure and designate the entity responsible for granting such authorisation.

GM2 Article 15(1) 'DATA QUALITY' and GM3 Article 15(1) 'DATA INTEGRITY'

The main objective of the Task Force was to agree on a common unique digital format of geographical zones, as mandated by Article 15(3) of the UAS Regulation. However, the EASA MSs requested to clarify the very important aspect of data quality, even if this is not directly covered by the UAS Regulation. The discussions focused on cases where geographical zones are either within controlled or uncontrolled airspace. However, no consensus about the quality of the data on geographical zones was reached among the members of the Task Force.

For cases where geographical zones are established in controlled airspace, the Task Force agreed that the data quality should meet the data quality requirements for prohibited, restricted, and danger areas of Appendix 1 'Aeronautical data catalogue' to Annex III (Part ATM/ANS.OR) to Regulation (EU) 2017/373 (the 'ATM/ANS Regulation')[20].

For data on geographical zones within uncontrolled airspace, the Task Force agreed that as a minimum, data integrity must be ensured as per point (b)(2) of point ATM/ANS.OR.A.085 'Aeronautical data quality management', as well as per point (c) of point AIS.TR.200 'General' of the ATM/ANS Regulation.

Q2 — GM2 to Article 15(1) and GM3 to Article 15(1)

Stakeholders are invited to comment on whether the ATM/ANS Regulation requirements for aeronautical data quality should be applicable to all kinds of geographical zones.

AMC1 and GM1 Article 15(2) 'EXEMPTION FROM ONE OR MORE OF THE "OPEN" CATEGORY REQUIREMENTS'

Article 15(2) of the UAS Regulation allows the EASA MSs to designate geographical zones in which UAS operations are exempted from one or more of the 'open' category requirements without the need for an authorisation (e.g. operations with UASs exceeding 25 kg, flying up to 1 000 ft AGL, or having no electronic identification). In such geographical zones, the UAS operators must still comply with the remaining applicable requirements (i.e. the ones laid down for the 'open' category or in the declaration, if covered by an STS, or in the operational authorisation in all other cases).

GM1 Article 15(2) provides examples of operations that EASA MSs may authorise in such geographical zones.

GM2 Article 15(2) 'MEANS TO INFORM MANNED AVIATION OF UAS GEOGRAPHICAL ZONES'

In geographical zones in which UAS operations are exempted from one or more of the 'open' category requirements, manned aviation needs to be aware of a possible UAS presence.

Q3 — GM2 to Article 15(2)

Stakeholders are invited to comment on what means should be used (e.g. Notice to Airmen (NOTAM)) to inform manned aviation of geographical zones in which UAS are exempted from one or more of the 'open' category requirements.

AMC1 Article 15(3) 'COMMON UNIQUE DIGITAL FORMAT'

To decide on a common unique digital format, as required by Article 15(3) of the UAS Regulation, the Task Force was supported by representatives of Subgroup 33 'UTM Geofencing' of the EUROCAE Working Group (WG) 105 'Unmanned Aircraft Systems'. They assessed the suitability of the data

[20] Commission Implementing Regulation (EU) 2017/373 of 1 March 2017 laying down common requirements for providers of air traffic management/air navigation services and other air traffic management network functions and their oversight, repealing Regulation (EC) No 482/2008, Implementing Regulations (EU) No 1034/2011, (EU) No 1035/2011 and (EU) 2016/1377 and amending Regulation (EU) No 677/2011 (OJ L 62, 8.3.2017, p. 1) (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32017R0373&qid=1622105187690).

format that is defined in EUROCAE ED-269[21] as 'common unique digital format for UAS geographical zones', identified a few issues, and solved them by adapting the draft ED-269, which was under consultation and finalisation at the time.

The Task Force concluded that the EASA MSs should define geographical zones using the common unique digital format that is described in Chapter 8 'UAS geographical zone data model' of ED-269, and introduced AMC1 Article 15(3) for this purpose. This AMC specifies the data model and interface protocol for delivering the UAS geographical zone information to UASs and other airspace users, independently of the way that this information is obtained and maintained.

AMC2 Article 15(3) 'PUBLICATION IN THE AIP OF INFORMATION ON UAS GEOGRAPHICAL ZONES'

Some EASA MSs plan to publish all data on UAS geographical zones in their aeronautical information publication (AIP), independently of their applicability to manned aviation. From a legal perspective, this could mean that all such data is compliant with the current aeronautical data quality requirements.

Other EASA MSs consider this approach impractical and expect an unnecessary negative economic impact as specific geographical zones are defined only to regulate UAS operations and are not applicable to manned aviation.

The proposed AMC and GM provide flexibility to the EASA MSs, which can decide on whether aeronautical data quality requirements are applicable based on the nature, location, and purpose of a geographical zone.

AMC3 Article 15(3) 'CROSS-BORDER UAS GEOGRAPHICAL ZONE(S)'

When defining a UAS geographical zone that exceeds the boundary of a MS (cross-border UAS geographical zone), then all EASA MSs affected by this UAS geographical zone should share data and should define a coordination process to ensure consistency among all resulting data sets.

Q4 — AMC3 to Article 15(3)

Stakeholders are invited to comment on whether EASA MSs should make available only data on the part of the geographical zone within their own territory, or on the entire zone including territory of neighbouring EASA MSs.

GM1 Article 15(3) 'PUBLICATION OF MAPS ON UAS GEOGRAPHICAL ZONES'

When an EASA MS decides to publish maps to illustrate geographical zones, it should ensure consistency with Chapter 8 'UAS geographical zone data model' of EUROCAE ED-269.

Further, if a UAS geographical zone is at the same time established and published for the purpose of informing manned aviation, consistency with the relevant AIP data should be ensured. U-space airspace is an example of such geographical zone.

To harmonise and simplify UAS operations, especially those crossing borders, the EASA MSs should, as far as practicable, use common layouts and similar colour codes for such maps.

21 EUROCAE ED-269 'MINIMUM OPERATIONAL PERFORMANCE STANDARD FOR GEOFENCING', June 2020.

The examples given in GM1 Article 15(3) are courtesy of the Latvian air navigation service provider (ANSP)[22] for the purpose of illustration only, and are not to be used for UAS operations.

Q5 — GM1 to Article 15(3)

Stakeholders are invited to comment on whether such examples of maps are helpful to the EASA MSs when implementing the rules for UAS geographical zones.

GM1 Article 19(1) 'SAFETY INFORMATION'

As described in AMC1 Article 15(1), in case of cross-border UAS geographical zones, the EASA MSs should coordinate the designation of such zones and exchange safety-related information.

The following topics were discussed within the Task Force, but it was decided not to incorporate them in the AMC and GM.

Common definition of all geographical zones

The Task Force identified and analysed possibilities of harmonising the different methods and practical values that are applied by EASA MSs for defining UAS geographical zones.

Based on current practice, there is a wide variety of arguments for or against the implementation of geographical zones and the size of such zones. A MS may consider that the implementation of geographical zones is required in one case, but this consideration may not be shared by another EASA MS. Therefore, GM1 Article 15(1) includes guidance material with a list of examples that stem from the EUROCONTROL/PODIUM project. The list is non-exhaustive and the EASA MSs may decide whether the geographical zones should be related to other structures/facilities. Possibly at a later stage, more common definitions may be agreed and used.

Traffic density

Article 15 does not refer to traffic density. For this reason, no related AMC and GM could be developed. Each EASA MS should consider the matter of traffic density locally.

Common vertical reference system

To ensure safety and prevent collisions of manned and/or unmanned aircraft, the horizontal and vertical separation of aircraft is of utmost importance. Ideally, all manned and unmanned aircraft should use the same vertical reference system.

In manned aviation, the vertical position of aircraft is based on barometric systems, whereas most of the UASs available on the market rely on satellite-based systems. The European Commission is investigating the possibility of developing a common altitude reference system. In parallel, the Single European Sky ATM Research Joint Undertaking (SESAR JU), among others, is running projects to investigate the situation and find a common solution for the future: either a common vertical reference system or different systems with appropriate mechanisms to ensure safety. For these reasons, the Task Force did not develop any AMC and GM on the matter. However, the common unique digital format that is described in Chapter 8 'UAS restriction zone data model' of ED-269 may accommodate both cases.

[22] Latvijas gaisa satiksme (LGS).

Static versus dynamic zones

Some geographical zones may be of a static nature (permanent zones) and permanently valid in terms of location and time. Other zones may be valid only within a predefined time frame, and according to a known time schedule. In case of an accident, building on fire, or other similar event, an ad hoc no-fly zone may be necessary to enable rescue forces to reach the area without facing the risk of collision with drones (e.g. helicopter emergency medical services (HEMS) operations conducted with the support of UAS). Therefore, geographical zones in such cases are dynamic in relation to time.

Other geographical zones may become necessary around moving objects, such as aircraft, trains, or around road traffic. Therefore, such zones are dynamic in terms of location.

Given the status of the available technical standards and the technical capabilities of UASs on the market, only geographical zones of a static nature in terms of time and location can be established.

To enable fully dynamic zones, the geo-awareness system of a UAS requires a permanent/real time connection to the entity that provides the data on geographical zones. These kinds of zones can only be established in the medium term, using the following phased approach (as for the U-space airspace):

(a) static geographical zones in terms of time and location and predefined zones activated within a predefined time frame;

(b) dynamic geographical zones in terms of time and activated/deactivated without pre-announcement; and

(c) dynamic geographical zones in terms of time and location.

The AMC and GM of this NPA concern phase (a). Phases (b) and (c) will be enabled through the upcoming U-space regulatory framework. Additional AMC and GM may have to be developed at a later stage.

2.3.5. ‘Designated’ versus ‘recognised’ entity

The UAS Regulation provides for two types of entities (‘designated entity’ and ‘recognised entity’) that may support the EASA MSs in fulfilling their tasks. When an EASA MS delegates an entity to fulfil one of the tasks identified in Article 18, that MS is required to designate that entity from the qualified entities as per Article 69 of the Basic Regulation.

For example, when the level of robustness of the risk mitigation means and of the OSOs that are defined in SORA is high, verification of compliance by a ‘competent third party’ is required. EASA received several questions for clarifying what ‘competent third party’ means. Consequently, the ‘competent third party’ is replaced with ‘the competent authority of the MS or by an entity designated by the competent authority’.

In addition, GM2 Article 17 ‘Designation of the competent authority’ is introduced to clarify the difference between ‘designated entity’ and ‘recognised entity’.

2.3.6. Training of personnel

All remote pilots are required to have a competency proportionate to the risk of the operation and, therefore, to the category in which the UA is operated. Appendix A to this NPA provides an overview of the competency subjects for the different subcategories of the ‘open’ and the ‘specific’ categories to show consistency among them.

In the 'open' category, the competency may be limited to familiarising oneself with the manufacturer's instructions, if a very light UAS is used (i.e. with a maximum take-off mass (MTOM) of less than 250 g).

All other remote pilots that operate a UAS in the 'open' category are required to successfully complete an online theoretical knowledge examination. If they operate in subcategory A2, remote pilots are required to supplement this training with a practical skill self-training and an additional theoretical knowledge examination.

For UAS operations in the 'specific' category, when covered by an STS, remote pilots are required to complete the online training course and pass the online theoretical knowledge examination as for the 'open' category and also pass an additional theoretical knowledge examination and a practical skill training.

As per point UAS.SPEC.050, for all other UAS operations in the 'specific' category, the UAS operator is required to define the training (both theoretical knowledge and practical skill training) that is needed for all personnel in charge of duties essential to the UAS operation (for example, in addition to remote pilots, the UAS operator may employ AOs, personnel in charge of the UAS launch or recovery, personnel involved in the maintenance of the UAS, etc.). That training should be based on the results of the risk assessment (e.g. SORA).

Some AMC and GM on the training of personnel in charge of duties essential to the UAS operation in the 'specific' category are already published. However, it was decided to reorganise them in a more structured way and supplement them with additional material.

Personnel in charge of duties essential to the UAS operation in the 'specific' category should have a generic theoretical competency, applicable to all types of UAS operations, and receive additional training that should be defined based on the specific type of operation.

Three new AMC to point UAS.SPEC.050(1)(d) are introduced:

— AMC1 (based on former GM1) that defines the theoretical knowledge applicable to all operations in the 'specific' category for remote pilots and other personnel in charge of duties essential to the UAS operation;

— AMC2 that defines the practical skill training applicable to all operations in the 'specific' category for remote pilots and other personnel in charge of duties essential to the UAS operation;

— AMC3 that defines the additional theoretical knowledge training, in combination with a practical skill training course based on the type of operation, for remote pilots.

UAS operators should propose to the competent authority, as part of their application, training courses based on the characteristics of the UAS operation to be conducted.

To define the learning objectives of the generic training, UAS operators should select, as appropriate for the intended UAS operation, the following:

— the subjects defined for the online theoretical training that is required for the 'open' subcategories A1 and A3, as per point UAS.OPEN.020 and related AMC1 UAS.OPEN.020(4)(b);

— the theoretical knowledge as per AMC1 UAS.SPEC.050(1)(d); and

— the practical skill training as per newly introduced AMC2 UAS.SPEC.050(1)(d).

GM1 UAS.SPEC.050(1)(d) is changed to AMC3 UAS.SPEC.050(1)(d) and UAS.SPEC.050(1)(e), as its content is more appropriate for an AMC, and it now includes a theoretical knowledge training on U-space and air risk.

The newly introduced AMC2 UAS.SPEC.050(1)(d) defines the practical skill training. The required practical skills are those defined in the practical skill training for the 'open' subcategory A2, with some additional elements mainly on procedures and action related to air risk and management of abnormal conditions. UAS operators should adapt the practical skill training to the characteristics of the operation and the available functions of the UAS. The training and assessment may be conducted using UASs or flight training devices (FTDs); the use of scenario-based training (SBT) is also acceptable.

In addition to the generic training, UAS operators should also define a theoretical knowledge training in combination with a practical skill training course that is specific to the intended UAS operation as described in the CONOPS. The newly introduced AMC3 UAS.SPEC.050(1)(d) defines the learning objectives for the following modules:

(a) night operations;

(b) overflight (flight over known populated areas or over assemblies of people in a given area of operation that is located in urban environment);

(c) beyond visual line of sight (BVLOS) operations;

(d) low-altitude (below 500 ft) controlled airspace (LACA);

(e) non-segregated flight;

(f) transport and/or dropping of cargo;

(g) transport of dangerous goods;

(h) operations with multiple UASs and UAS swarms;

(i) UAS launch and recovery using special equipment;

(j) flying over mountainous terrain.

AMC1 UAS.SPEC.050(1)(e)(ii) is, therefore, deleted as all competencies that are required for personnel in charge of duties essential to the UAS operation are introduced in AMC3 UAS.SPEC.050(1)(d).

A similar approach is also used for UAS operations that are covered by a PDRA. Appendix A to AMC2 Article 11 includes the training conditions for personnel in charge of duties essential to the UAS operation, the responsibilities of some personnel (e.g. the AOs), and various conditions applicable to the PDRAs. Appendix A is deleted, and in some cases its content is moved as follows:

— The training described in point A.1.1.2 of the Appendix is not peculiar to a PDRA but, in most cases, a duplication of the generic training applicable to all remote pilots that operate UASs in the 'specific' category, as explained in GM1 UAS.SPEC.050(1)(d). This point is, therefore, deleted.

— The remaining text of point A.1 of the Appendix is introduced into the PDRAs (i.e. in AMC2, AMC3 and AMC4 to Article 11).

— The AO responsibilities that are listed in point A.2. of the Appendix are a duplicate of the provisions of point UAS.STS-02-050 and applicable to all cases where an AO is employed. To clarify this, GM1 to Article 2(25) is introduced.

— The content of points A.3., A.4., A.5. and A.6. is introduced into the PDRAs (i.e. in AMC2, AMC3 and AMC4 to Article 11).

Other amendments related to remote pilot training

— AMC2 UAS.OPEN.020(4)(b) and UAS.OPEN.040(3) on the 'proof of completion of the online training' for A1 and A3 operations, and AMC1 UAS.OPEN.030(2) on the 'remote pilot certificate of competency' for A2 operations are amended to update the format of the certificates and indicate in the instructions all the elements to be filled in.

— According to AMC1 UAS.OPEN.020(5)(c) and (d), UAS.OPEN.030(3) and UAS.OPEN.040(4)(c), (d) and (e), no modification may be made to a UAS with a class identification label. Said AMC specifies that in case of modification, the UAS can only be operated in subcategory A3 of the 'open' category or in the 'specific' category. After further evaluation, it was established that a modification to a UAS with a class identification label may make it unsafe. Therefore, such a modified UAS should be operated only after receiving an operational authorisation in the 'specific' category.

— AMC1 UAS.OPEN.030(2)(b) is amended to specify that the practical skill training in contingency procedures should be limited to those procedures that do not require to deactivate the UAS functions that may reduce its safety level. Therefore, some subjects are removed from AMC1 UAS.OPEN.030(2)(b) and are introduced in AMC1 UAS.OPEN.020(4)(b) and UAS.OPEN.040(3) to be included in the theoretical knowledge training.

— AMC2 UAS.OPEN.030(2)(b) is amended to remove the practical training in abnormal situations, which requires the remote pilot to simulate a dangerous situation. The way to cope with such a situation should be covered by the theoretical knowledge training. For this reason, AMC1 UAS.OPEN.020(4)(b) and UAS.OPEN.040(3) are also amended.

— AMC2 UAS.OPEN.030(2)(a) 'UAS operations in subcategory A2' and Attachment A to Chapter I of Appendix 1 'REMOTE PILOT THEORETICAL KNOWLEDGE AND PRACTICAL SKILL EXAMINATION FOR STS-01' is introduced to indicate that the theoretical knowledge examination for the certificate of remote pilot competency for subcategory A2 and for the remote pilot theoretical knowledge for STS-01 may be taken either as a face-to-face or as an online-proctored examination. For the latter case, the AMC includes several conditions for an adequate examination. This AMC resulted from discussions with the competent authorities, which indicated that the theoretical knowledge examinations that are required for operating in subcategory A2 of the 'open' category or under STS-01 do not need to be conducted face-to-face, considering the possible burden for a remote pilot to travel to an examination centre, compared to the limited risk of an operation in the 'open' category. EASA explored the possibility of conducting such examination using online proctoring systems to ensure that the examinees are indeed the registered individuals and are not receiving any support other than that specified in the examination procedure.

2.3.7. Other amendments

The following AMC and GM are amended or introduced:

— Point (5) is added to AMC1 Article 18(e) to cover the records to be kept by the competent authority on audits and inspections that are conducted to UAS operators from whom they received a declaration or to whom they issued an authorisation or a certificate. The competent authority should also keep records on standardisation audits that are performed by EASA.

— GM1 to Article 22(b) is introduced to clarify that also during the transition period (until 1 January 2021), the term 'people', which is used in the article, should read 'involved persons', as for subcategory A2, which is defined in point UAS.OPEN.030. Article 22(b) allows the remote pilot to operate a UA that has a weight of less than 2 kg in subcategory A2. In this subcategory, the remote pilot is also allowed to fly the UA over involved persons.

— GM2 UAS.OPEN.030(4) is introduced to clarify that UASs with class label 0 or 1 can also be used in subcategory A3.

— AMC1 UAS.OPEN.050(1) is amended to replace 'procedures defined by the manufacturer in the OM' by 'procedures defined in the manufacturer's instructions'.

— GM1 UAS.SPEC.020(1)(b) is introduced to illustrate the meaning of 'the probability of encountering manned aircraft is not low' in the airspace-related requirement for STSs of point UAS.SPEC.020(1)(b).

— AMC1 UAS.SPEC.040(1) on the operational authorisation template is amended to replace 'brand' by 'manufacturer', to improve terminology and consistency with the other forms and templates.

— GM1 UAS.SPEC.050(1)(d)(iii) is introduced to clarify the cases when the competent authority is required to coordinate with a designated entity on the remote pilot training.

2.3.8. AMC and GM to the Appendices to the Annex (Part-UAS) to the UAS Regulation on STSs

Several AMC and GM for STSs are introduced:

— AMC1 UAS.STS-01.020(1)(e)(i) and UAS.STS-02.020(7)(a) define the format of the theoretical knowledge certificate of the remote pilot for STSs. This certificate can be obtained only if the candidate has already successfully completed the online examination for subcategories A1 and A3 of the 'open' category; therefore, both logos appear on the certificate. If candidates undergo the practical skill training that is required for an A2 certificate before the theoretical knowledge examination for STSs, and are able to declare it, they can receive a certificate that covers subcategories A1, A3, and A2, as well as STSs.

— AMC1 UAS.STS-01.020(1)(e)(ii) and UAS.STS-02.020(7)(b) defines how the progress of a student remote pilot's training is documented.

— GM1 UAS.STS-01.020(1)(e)(ii) and UAS.STS-02.020(7)(b) explain which entities may carry out the continuous evaluation of the practical training.

— GM1 UAS.STS-01.020(1)(c) indicates that the values listed in the UAS Regulation for determining the size of the ground risk buffer should be regarded as minimum values and additional factors may need to be considered.

— AMC1 UAS.STS-01.030(2) and UAS.STS-02.030(2) on the 'operational volume determination' indicate that the UAS operator, when determining the operational volume, should consider the position-keeping capabilities of the UAS, i.e. aspects such as the accuracy of the navigation solution, the flight technical error and the path definition error, as well as the latencies.

— AMC1 UAS.STS-01.030(1)&(3) and UAS.STS-02.030(1)&(3) on 'operational procedures' indicates that the conditions for a medium level of robustness, which are included in AMC2 UAS.SPEC.030(3)(e), are also applicable to the operational procedures that are contained in the OM, including the assurance of the adequacy of the contingency and emergency procedures. Moreover, the flight test for verifying the adequacy of the contingency and emergency procedures may be conducted in subcategory A3 of the 'open' category as a UAS with a class identification label 5 or 6 will also bear class identification label 3. The UAS operator should ensure that the operation complies with the requirements for the 'open' category.

— AMC1 UAS.STS-01.030(4) and UAS.STS-02.030(4) on 'emergency response plan (ERP)' indicates that the conditions for a medium level of robustness, which are included in AMC3 UAS.SPEC.030(3)(e), are also applicable to the ERP that is required for the STSs.

— GM1 UAS.STS-01.030(5)&(6) and GM1 UAS.STS-02.030(5)&(6) provides guidance on and examples of the 'external services' that are provided to the UAS operator under the corresponding STS requirements.

— AMC1 UAS.STS-02.020(3) provides guidance on the interpretation of the minimum 'flight visibility' requirement of STS-02, and on how the UAS operator may gather the relevant information that may affect flight visibility, including suitable weather information sources.

— AMC1 Appendix 2 on the 'operational declaration form' clarifies that a UAS operator that intends to operate different UASs under the same STS may specify all employed UASs in a single operational declaration.

2.4. What are the expected benefits and drawbacks of the proposed amendments

The proposed amendments are expected to improve harmonisation of the implementation of the UAS Regulation among the EASA MSs.

No drawback is envisaged.

3. Proposed amendments and rationale

The amendment is arranged to show deleted, new or amended, and unchanged text as follows:

— deleted text is ~~struck through~~;

— new or amended text is highlighted in blue;

— an ellipsis '[…]' indicates that the rest of the text is unchanged.

Where necessary, the rationale is provided in *blue italics*.

3.1. Draft acceptable means of compliance and guidance material (draft EASA decision)

3.1.1. Draft AMC and GM to Commission Implementing Regulation (EU) 2019/947 (Cover Regulation)

List of abbreviations

CRM	crew resource management
DSSS	direct-sequence spread spectrum
ERM	emergency response manager
ERT	emergency response team
EVLOS	extended visual line of sight
FTD	flight training device
ICAO	International Civil Aviation Organization
LACA	low-altitude controlled airspace (below 500 ft)
MS	Member State
OFDM	orthogonal frequency-division multiplexing
RCM	remote crew member
SDS	Safety Data Sheets
TOM	take-off mass
USSP	U-space service provider

AMC1 Article 2(11) Definitions

DEFINITION OF 'DANGEROUS GOODS'

~~Under the definition of dangerous goods, blood may be considered to be capable of posing a hazard to health when it is contaminated or unchecked (potentially contaminated). In consideration of Article 5(1)(b)(iii):~~

~~(a) medical samples such as uncontaminated blood can be transported in the 'open', 'specific' or 'certified' categories;~~

~~(b) unchecked or contaminated blood must be transported in the 'specific' or the 'certified' categories. If the transport may result in a high risk for third parties, the UAS operation belongs to the 'certified' category (see Article 6 1.(b) (iii) of the UAS Regulation). If the blood is enclosed in a container such that in case of an accident, the blood will not be spilled, the UAS operation may belong to the 'specific' category, if there are no other causes of high risk for third parties.~~

'Dangerous goods' should be considered any article or substance which is identified as such in the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO Doc 9284).

GM1 Article 2(11) Definitions

DEFINITION OF 'DANGEROUS GOODS'

'Dangerous goods' are 'articles or substances, which are capable of posing a hazard to health, safety, property or the environment', which appear on the list of dangerous goods of the ICAO Technical Instructions for the Safe Transport of Dangerous Goods by Air (ICAO Doc 9284), known as the 'technical instructions', or which are classified according to the technical instructions. ICAO Advisory Circular (AC) 102-37, Revision 0, issued on 23 June 2020, contains further information on the definition of 'dangerous goods' in Article 2(11) of the UAS Regulation, which stems from the definition and classification of 'dangerous goods' in the technical instructions.

Under the definition of 'dangerous goods' in Article 2(11), blood is considered capable of posing a hazard to health when it contains or may contain infectious substances.

'Infectious substances' means substances that are classified under Division 6.2 of the technical instructions. The definition and classification of such substances are also available in the above-mentioned ICAO AC 102-37.

Medical samples that are not subject to the provisions of the technical instructions may be transported in the 'open', 'specific', or 'certified' categories.

Blood that contains or potentially contains infectious substances should be transported in the 'specific' or 'certified' categories. If such transport results in a high risk for third parties in case of an accident, the UAS operation falls under the 'certified' category (as per Article 6(1)(b)(iii) of the UAS Regulation). If the blood contains or potentially contains infectious substances and is enclosed in such a container such that the blood will not be spilled in case of an accident, the UAS operation may fall under the 'specific' category if there are no other causes of high risk for third parties.

The following are examples of dangerous goods that may be transported by UA:

(a) compressed gases, e.g. aerosols and gas cartridges;

(b) flammable liquids, e.g. ethanol, ether;

(c) sterilisation materials, e.g. ethylene oxide;

(d) infectious substances, e.g. analysis samples;

(e) toxic substances, e.g. certain medicines;

(f) first-aid kits;

(g) medical or clinical waste, e.g. blood samples and used needles;

(h) lithium batteries; and

(i) dry ice.

The above is a non-exhaustive list that may be supplemented by other dangerous goods provided the UAS operator demonstrates that:

(a) other forms of transport are impractical; and

(b) the risk for third parties is minor.

GM1 Article 2(18) Definitions

DEFINITION OF 'UNINVOLVED PERSONS'

Due to the huge variety of possible circumstances, this GM only provides general guidelines.

An uninvolved person is a person that does not take part in the UAS operation, either directly or indirectly.

A person may be considered to be 'involved' when ~~they have~~the following three conditions are met: The person:

(a) has given explicit consent to the UAS operator or to the remote pilot to be part of the UAS operation (even indirectly as a spectator or just accepting to be overflown by the UAS); ~~and~~

(b) has received from the UAS operator or from the remote pilot clear instructions and safety precautions to follow in case the UAS exhibits any unplanned behaviour~~.~~; and

(c) is only focused on the operational activity so that the person can monitor at all times the position of the UA and, in case of a loss of control of the UA, can take action to avoid being hit.

[…]

GM1 Article 2(21), (28), (29), (30), (31), (32), and (33) Definitions

DEFINITIONS OF 'CONTROLLED GROUND AREA', 'FLIGHT GEOGRAPHY', 'FLIGHT GEOGRAPHY AREA', 'CONTINGENCY VOLUME', 'CONTINGENCY AREA', 'OPERATIONAL VOLUME' AND 'GROUND RISK BUFFER'

'flight geography' is the spatially and temporally defined volume of airspace in which the UAS operator plans to conduct the operation under normal procedures; the projection of such volume on the surface of the earth constitutes the 'flight geography area'.

To cope with abnormal situations (e.g. navigation errors, UA drifting due to wind/gusts, etc.), the UAS operator should define the 'contingency volume' as an airspace volume where contingency procedures are applied in order to bring the UA back to a normal situation within the 'flight geography'. The projection of such volume on the surface of the earth is the 'contingency area'.

'operational volume' includes 'flight geography' and 'contingency volume'.

'ground risk buffer' is the area on the surface of the earth surrounding the operational volume, which is defined by the UAS operator to minimise the risk to third parties on the surface in case the UA leaves the operational volume.

'controlled ground area' is an area on the ground (on the surface of the earth) where the UAS operator ensures that only involved persons are present. Such area comprises the 'flight geography area', the 'contingency area' and the 'ground risk buffer'.

The relation between 'flight geography', 'flight geography area', 'contingency area', 'operational volume', and 'ground risk buffer' are depicted in Figure 1 below:

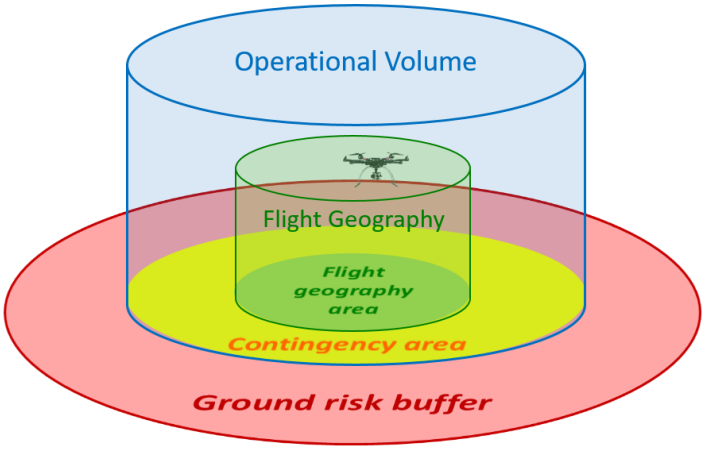

Figure 1 — Relation between 'flight geography', 'flight geography area', 'contingency area', 'operational volume', and 'ground risk buffer'

GM1 Article 2(25) Definitions

RESPONSIBILITIES OF THE AIRSPACE OBSERVER (AO)

The AO's main responsibilities are defined in point UAS.STS-02.050, which is applicable every time an AO is employed.

AMC1 Article 5 'Specific' category of UAS operations

TRANSPORT OF DANGEROUS GOODS IN THE 'SPECIFIC' CATEGORY

(a) Dangerous goods may be transported during UAS operations in the 'specific' category only in a crash-protected container which will prevent the leakage/dispersion of dangerous goods in case of accident.

(b) The assessment of the operational risk of transporting dangerous goods should be carried out taking into account the following:

(1) the risk that such goods pose to persons that are directly involved in their handling, to the environment, and to third parties and their properties;

(2) the hazard posed by the class of the dangerous goods; and

(3) the 'Safety Data Sheets (SDSs)' document, which is published in accordance with the EU Regulation[23] controlling chemicals in Europe (**R**egistration, **E**valuation, **A**uthorisation & Restriction of **Ch**emicals (REACH).

(c) The UAS operator that wishes to carry out operations in the 'specific' category to transport dangerous goods should provide the personnel involved in those operations with adequate

[23] REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No 793/93 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC (OJ L 396, 30.12.2006, p. 1) (https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32006R1907&qid=1622553126849&from=EN).

training that covers at least the following aspects regarding the identification and awareness of dangerous goods:

(1) dangerous goods terminology;

(2) classification of dangerous goods;

(3) labelling of dangerous goods;

(4) identification of dangerous goods that use 'SDSs' and the Globally Harmonised System of Classification and Labelling of Chemicals (GHS) consumer labelling;

(5) use of the dangerous goods list provided in the technical instructions (at least columns 1-6);

(6) handling of dangerous goods; and

(7) emergency/reporting procedures in case of an incident with dangerous goods.

GM1 ~~to~~ AMC1 Article 11 Rules for conducting an operational risk assessment

GENERAL

[…]

PDRA#	Edition/date	UAS characteristics	BVLOS /VLOS	Overflown area	Maximum range from remote pilot	Maximum height	Airspace	AMC# to Article 11	Notes
PDRA-S01	1.0/July 2020	Maximum characteristic dimension of up to 3 m and take-off mass of up ~~of~~ to 25 kg	VLOS	Controlled ground area that might be located in a populated area	VLOS	120 m	Controlled or uncontrolled, with low risk of encounter with manned aircraft	AMC4	
PDRA-S02	1.0/July 2020	Maximum characteristic dimension of up to 3 m and take-off mass of up to 25 kg	BVLOS	Controlled ground area that is entirely located in a sparsely populated area	2 km with ~~(~~an~~)~~ AO(s) 1 km, if no AO	120 m	Controlled or uncontrolled, with low risk of encounter with manned aircraft	AMC5	
PDRA-G01	1.1/July 2020	Maximum characteristic dimension of up to 3 m and typical kinetic energy of up to 34 kJ	BVLOS	Sparsely populated areas	If no AO, up to 1 km	150 m (operational volume)	Uncontrolled, with low risk of encounter with manned aircraft	AMC2	
PDRA-G02	1.0/July 2020	Maximum characteristic dimension of up to 3 m and typical kinetic energy of up to 34 kJ	BVLOS	Sparsely populated areas	~~N~~n/a (direct C2 link)	As established for the reserved or restricted airspace	~~As r~~Reserved or restricted for the UAS operation	AMC3	

Table 2 — List of PDRAs published as AMC~~2 5~~ to Article 11 ~~t~~of the UAS Regulation

For the purposes of the SORA, the following definitions apply:

— ‘populated area’ should be understood as ‘congested area’ defined in Regulation (EU) No 965/2012 (the ‘Air Operations Regulation’): ‘in relation to a city, town or settlement, any area which is substantially used for residential, commercial or recreational purposes’; and

— ‘rural area’ is used in the context of the air risk and means areas that are located outside an airport environment.

AMC1 Article 11 Rules for conducting an operational risk assessment

SPECIFIC OPERATIONS RISK ASSESSMENT (SORA) (SOURCE JARUS SORA V2.0)

[…]

1.5 Roles and responsibilities

[…]

(f) Competent authority — The competent authority that is referred to throughout this AMC is the authority designated by the Member State in accordance with Article 17 of the UAS Regulation to assess the safety case of UAS operations and to issue the operational authorisation in accordance with Article 12 of the UAS Regulation. The competent authority may accept an applicant's SORA submission in whole or in part. Through the SORA process, the applicant may need to consult with the competent authority to ensure the consistent application or interpretation of individual steps. The competent authority must perform oversight of the UAS operator in accordance with paragraphs (i) and (j) of Article 18 of the UAS Regulation. According to Regulation (EU) 2018/1139[24] (the EASA 'Basic Regulation'), EASA is the competent authority ~~competent~~ in the European Union to verify compliance of the UAS design and its components with the applicable rules, while the authority that is designated by the Member State is competent to verify compliance with the operational requirements and compliance of the personnel's competency with those rules. The following elements are related to the UAS design:

— OSOs #02 (limited to design criteria), #04, #05, #06, #10, #12, #18, #19 (limited to criterion #3), #20, and #24;

— M1 mitigation (tethered operations): criterion #1, and M2 mitigation: criterion #1;

— verification of the system to contain the UAS within the operational volume in accordance with Step #9 of the SORA process.

When, according to the SAIL ~~or to the claimed mitigation means~~, the level of assurance of the above OSOs ~~and/or mitigation means~~ is 'high' (i.e. SAIL V and VI), a ~~verification~~type certificate (TC) issued by EASA according to Annex I (Part 21) to Regulation (EU) No 748/2012 (the 'Initial Airworthiness Regulation')[25] is required

[24] Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91 (OJ L 212, 22.8.2018, p. 1) (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32018R1139).

[25] Commission Regulation (EU) No 748/2012 of 3 August 2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations (OJ L 224, 21.8.2012, p. 1) (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32012R0748&qid=1622557691925).

~~according to~~as defined in Article 40(1)(d) of Regulation (EU) 2019/945[26]. For the other OSOs and mitigation means, the competent authority defines which third party is able to verify compliance with them.

Despite of the SAIL, when the level of robustness of the mitigation means (M1: criterion #1, or M2: criterion #1) is high or the enhanced containment according to SORA step #9 is applicable, the competent authority should require an EASA verification of compliance with those mitigation means.

If the level of robustness of the design-related OSOs and/or mitigation means is 'medium'~~lower than 'high'~~, the competent authority may still require a verification by EASA of the compliance of the UAS and/or its components with the design-related OSOs and/or mitigation means[27] ~~according to point Article 40(1)(d) of Regulation (EU) 2019/945~~. Similarly, also for UAS operators to which the competent authority has granted a light UAS operator certificate (LUC), the terms of the approval ~~may~~ should require to use a UAS that is certified or verified by EASA according to the criteria defined above.~~when conducting operations for which the level of robustness of the design-related OSOs and/or mitigation means is lower than 'high'. In those cases,~~ EASA will verify that the achievement of the design integrity level is appropriate to the related SAIL and to the mitigation means, when those means are applicable, and will issue a design verification report[28]~~type certificate (TC) (or a restricted type certificate (RTC)) to the UAS manufacturer~~, which will cover all design-related OSOs, the design-related mitigation means, and the enhanced containment verification in accordance with Step #9, ~~if that verification i~~as applicable. Alternatively, the competent authority that issues the operational authorisation may accept a declaration by the UAS operator~~,~~ which ~~who~~ is responsible for the compliance of the UAS with the design-related OSOs.

[…]

2.5.3 Step #9 – Adjacent area/airspace considerations

(a) The objective of this section is to address the risk posed by a loss of control of the operation, resulting in an infringement of the adjacent areas on the ground and/or adjacent airspace. These areas may vary with different flight phases.

(b) Safety requirements for containment are:

[26] Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems (OJ L 152, 11.6.2019, p. 1) (https://eur-lex.europa.eu/legalcontent/EN/TXT/?uri=CELEX:32019R0945).

[27] The design verification basis in the 'specific' category of operation (SAIL III and IV) is SC Light UAS, as adopted by EASA in December 2020; this applies for the UAS as well as for the mitigation means linked with design and containment (step #9).

[28] https://www.easa.europa.eu/sites/default/files/dfu/guidelines_design_verification_uas_medium_risk.pdf

~~1.~~ No probable[29] failure[30] of the UAS or any external system supporting the operation should lead to operation outside the operational volume.

Compliance with the requirement above should~~shall~~ be substantiated by a design and installation appraisal and ~~shall~~should include at least:

1. *the design and installation features (independence, separation and redundancy);*
2. *any relevant particular risk (e.g. hail, ice, snow, electromagnetic ~~electro-magnetic~~ interference, etc.) associated with the ConOps.*

The competent authority should request EASA to validate the claimed integrity.

[…]

Annex B to AMC1 ~~to~~ Article 11

INTEGRITY AND ASSURANCE LEVELS FOR THE MITIGATIONS USED TO REDUCE THE INTRINSIC GROUND RISK CLASS (GRC)

[…]

B.2 M1 —~~-~~ Strategic mitigations for ground risk

[…]

		Level of assurance		
		Low	**Medium**	**High**
M1 — Strategic mitigations for ground risk	Criterion #1 (Definition of the ground risk buffer)	The applicant declares that the required level of integrity has been ~~is~~ achieved[1].	The applicant has supporting evidence to claim that the required level of integrity has been achieved. This is typically done by means of testing, analysis, simulation[2], inspection, design review or through operational experience.	The claimed level of integrity is validated by the competent authority of the MS or by an entity that is designated by the ~~a~~ competent authority~~third party~~.
	Comments	*[1] Supporting evidence may or may not be available.*	*[2] When simulation is used, the validity of the targeted environment used in the simulation needs to be justified.*	~~N/A~~*n/a*
	Criterion #2 (Evaluation of people at risk)	The applicant declares that the required level of integrity has been achieved[3].	The density data used for the claim of risk reduction is an average density map for the date/time of the operation from a static sourcing (e.g. census data for night-time ops).	Same as medium; however, the density data used for the claim of risk reduction is a near-real-time density map from a dynamic sourcing (e.g. cellular user

29 The term 'probable' needs to be understood in its qualitative interpretation, i.e. 'Anticipated to occur one or more times during the entire system/operational life of an item.'

30 The term 'failure' needs to be understood as an occurrence that affects the operation of a component, part, or element such that it can no longer function as intended. Errors may cause failures~~,~~ but are not considered to be failures. Some structural or mechanical failures may be excluded from the criterion if it can be shown that these mechanical parts were designed according to aviation industry best practices.

		Level of assurance		
		Low	**Medium**	**High**
			In addition, for localised operations (e.g. intra-city delivery or infrastructure inspection), the applicant submits the proposed route/area of operation to the applicable authority (e.g. city police, office of civil protection, infrastructure owner, etc.) to verify the claim of a reduced number of people at risk.	data) and applicable for the date/time of the operation.
	Comments	*[3] Supporting evidence may or may not be available*	~~*N/A*~~*n/a*	~~*N/A*~~*n/a*

Table B.3 — Level of assurance assessment criteria for ground risk of non-tethered M1 mitigations

[…]

		Level of assurance		
		Low	**Medium**	**High**
M1 — Tethered operation	Criterion #1 (Technical design)	Does not meet the 'medium' level criteria	The applicant has supporting evidence (including the specifications of the tether material) to claim that the required level of integrity is achieved. (a) This is typically achieved through testing or operational experience. (b) Tests can be based on simulations; however, the validity of the target environment used in the simulation needs to be justified. The competent authority may request EASA to validate the claimed integrity.	The claimed level of integrity is validated by EASA.
	Comments	~~*N/A*~~*n/a*	~~*N/A*~~*n/a*	~~*N/A*~~*n/a*
	Criterion #2 (Procedures)	(a) Procedures ~~do~~are not ~~require validation~~validated against either a standard or a means of compliance considered adequate by the competent authority of the MS. (b) The adequacy of the procedures and checklists is declared.	(a) Procedures are validated against standards considered adequate by the competent authority of the MS and/or in accordance with the means of compliance acceptable to that authority[1]. (b) The ~~A~~adequacy of the procedures is proven through: (1) dedicated flight tests; or	Same as medium. In addition: (a) Flight tests performed to validate the procedures cover the complete flight envelope or are proven to be conservative. (b) The procedures, flight tests and simulations are validated by the competent authority of the MS or by an entity that is designated by the

			(2) simulation, provided that the representativeness of the simulation means is proven to be valid for the intended purpose with positive results; or (3) any other means acceptable to the competent authority of the MS.	~~a~~competent authority~~third party~~.
	Comments	~~*N/A*~~*n/a*	~~*N/A*~~[1] *AMC2 UAS.SPEC.030(3)(e) (Operational procedures for medium and high levels of robustness) is considered an acceptable means of compliance.*	~~*N/A*~~*n/a*

Table B.5 — Level of assurance assessment criteria for ground risk tethered M1 mitigations

B.3 M2 — Effects of ground impact are reduced

[...]

		Level of assurance		
		Low/None	**Medium**	**High**
M2 — Effects of UA impact dynamics are reduced (e.g. parachute)	Criterion #1 (Technical design)	The applicant declares that the required level of integrity has been achieved[1].	The applicant has supporting evidence to claim that the required level of integrity is achieved. This is typically[2] done by means of testing, analysis, simulation[3], inspection, design review or through operational experience. The competent authority may request EASA to validate the claimed integrity.	The claimed level of integrity is validated by EASA against a standard considered adequate by EASA and/or in accordance with means of compliance acceptable to EASA (when applicable).
	Comments	*[1] Supporting evidence may or may not be available.*	*[2] The use of industry standards is encouraged when developing mitigations used to reduce the effect of ground impact.* *[3] When simulation is used, the validity of the targeted environment used in the simulation needs to be justified.*	
	Criterion #2 (Procedures, if applicable)	(a) Procedures ~~do~~are not ~~require~~ validated~~ion~~ against either a standard or a means of compliance considered adequate by the competent authority of the MS.	(a) Procedures are validated against standards considered adequate by the competent authority of the MS and/or in accordance with the means of compliance	Same as medium. In addition: (a) Flight tests performed to validate the procedures cover the complete flight envelope or are proven to be conservative. (b) The procedures, flight tests and simulations are validated

		(b) The adequacy of the procedures and checklists is declared.	acceptable to that authority[1]. (b) The ~~A~~adequacy of the procedures is proven through: (1) dedicated flight tests; or (2) simulation, provided that the representativeness of the simulation means is proven to be valid for the intended purpose with positive results; or (3) any other means acceptable to the competent authority of the MS.	by the competent authority of the MS or by an entity that is designated by the ~~a~~ competent authority~~third party~~.
	Comments	~~N/A~~*n/a*	~~N/A~~[1] *AMC2 UAS.SPEC.030(3)(e) (Operational procedures for medium and high levels of robustness) is considered an acceptable means of compliance.*	~~N/A~~*n/a*
	Criterion #3 (Training, if applicable)	Training is self-declared (with evidence available)	(a) Training syllabus is available. (b) The UAS operator provides competency-based, theoretical and practical training.	(a) Training syllabus is validated by the competent authority of the MS or by an entity that is designated by the ~~a~~ competent authority~~third party~~. (b) Remote crew competencies are verified by the competent authority of the MS or by an entity that is designated by the ~~a~~ competent authority~~third party~~.
	Comments	~~N/A~~*n/a*	~~N/A~~*n/a*	~~N/A~~*n/a*

Table B.7 ~~-~~— Level of assurance assessment criteria for M2 mitigations

B.4 M3 — An ERP is in place, UAS operator validated and effective

[…]

		Level of assurance		
		Low/None	**Medium**	**High**
M3 — An ERP is in place, UAS operator validated and effective	Criterion #1 (Procedures)	(a) The ERP~~Procedures do~~ is not ~~require~~ validated~~ion~~ against either a standard or a means of compliance that is considered adequate by the competent authority of the MS. (b) The adequacy of the procedures and checklists that are included in the ERP is declared.	(a) The ERP is developed to standards considered adequate by the competent authority of the MS and/or in accordance with means of compliance acceptable to that authority[1]. (b) Unless the operator is a one-person organisation, ~~T~~the ERP is validated through a representative tabletop exercise~~[2]~~ consistent with the ERP training syllabus.	(a) Same as medium. In addition: (b) The ERP and the effectiveness of the plan with respect to limiting the number of people at risk are validated by a competent third party. (c) The applicant has coordinated and agreed the ERP with all third parties identified in the plan. (d) The representativeness of the tabletop exercise is validated by a competent third party.
	Comments	~~N/A~~*n/a*	[1] *AMC3 UAS.SPEC.030(3)(e) (ERP for medium and high level of robustness) is considered an acceptable means of compliance.* ~~[2]~~ *The tabletop exercise may or may not involve all third parties that are identified in the ERP. Depending on the level of risk of the UAS operation, the competent authority may require that the ERP and its effectiveness be validated by the MS competent authority itself or by an entity that is designated by the competent authority.*	~~N/A~~*n/a*
	Criterion #2 (Training)	Does not meet the 'medium' level criterion	(a) An ERP training syllabus is available. (b) A record of the ERP training completed by the relevant staff is established and kept up to date. Depending on the level of risk of the UAS operation, the competent authority may require that competencies of the relevant staff be verified by itself or by an entity that is designated by the competent authority.	Same as medium. In addition, the competencies of the relevant staff are verified by a competent third party.

		Level of assurance		
		Low/None	Medium	High
	Comments	~~*N/A*~~*n/a*	~~*N/A*~~*n/a*	~~*N/A*~~*n/a*

Table B.9 — Level of assurance assessment criteria for M3 mitigations

Annex C to AMC1 ~~to~~ Article 11

STRATEGIC MITIGATION — COLLISION RISK ASSESSMENT

[…]

C.3.3 SORA flight rules assumptions

Today, UAS flight operations under the 'specific' category cannot fully comply with the IFR and VFR rules as written. Although IFR infrastructures and mitigations are designed for manned aircraft operations (e.g. minimal safe altitudes, equipage requirements, operational restrictions, etc.), it may be possible for a UAS to comply with the IFR requirements. UASs operating at very low levels (e.g. ~~400~~500 ft AGL and below) may technically comply with the IFR rules, but the IFR infrastructure was not designed with that airspace in mind; therefore, mitigations for this airspace would be derived, and would be highly impractical and inefficient. When operating BVLOS, a UAS cannot comply with VFR[31].

[…]

C.6.2 Lowering the initial ARC using operational restrictions (optional)

[…]

Operational environment, AEC and ARC			
Operations in:	**Initial generalised density rating**	**Corresponding AEC**	**Initial ARC**
Airport/heliport environment			
OPS in an airport/heliport environment in class B, C or D airspace	5	AEC 1	ARC-d
OPS in an airport/heliport environment in class E airspace or in class F or G	3	AEC 6	ARC-c
Operations above 400 ft AGL but below flight level 600			
OPS > 4500 ft AGL but < FL 600 in a Mode-S Veil or transponder mandatory zone (TMZ)	5	AEC 2	ARC-d
OPS > 400 ft AGL but < FL 600 in controlled airspace	5	AEC 3	ARC-d
OPS > 4500 ft AGL but < FL 600 in uncontrolled airspace over an urban area	3	AEC 4	ARC-c
OPS > 4500 ft AGL but < FL 600 in uncontrolled airspace over a rural area	2	AEC 5	ARC-c

[31] A UAS operating under VLOS may be able to comply with VFR.

Operational environment, AEC and ARC			
Operations in:	**Initial generalised density rating**	**Corresponding AEC**	**Initial ARC**
Operations below 400 ft AGL			
OPS < 4500 ft AGL in a Mode-S Veil or TMZ	3	AEC 7	ARC-c
OPS < 4500 ft AGL in controlled airspace	3	AEC 8	ARC-c
OPS < 4500 ft AGL in uncontrolled airspace over an urban area	2	AEC 9	ARC-c
OPS < 4500 ft AGL in uncontrolled airspace over a rural area	1	AEC 10	ARC-b
Operations above flight level 600			
OPS > FL 600	1	AEC 11	ARC-b
Operations in atypical or segregated airspace			
OPS in atypical/segregated airspace	1	AEC 12	ARC-a

Table C.1 — ~~–~~ Initial air risk ~~category~~ class assessment

[…]

The density rating of manned aircraft, assessed on a scale of 1 to 5, with 1 representing a very low density and 5 representing a very high density.				
Column	A	B	C	D
AEC	Initial generalised density rating for the environment	Initial ARC	If the local density can be demonstrated to be similar to:	New lowered (residual) ARC
AEC 1 or; AEC 2	5	ARC-d	4 or 3	ARC-c
			2 or 1[Note 1]	ARC-b
AEC 3	4	ARC-d	3 or 2	ARC-c
			1[Note 1]	ARC-b
AEC 4	3	ARC-c	1[Note 1]	ARC-b
AEC 5	2	ARC-c	1[Note 1]	ARC-b
AEC 6 or; AEC 7 or; AEC 8	3	ARC-c	1[Note 1]	ARC-b
AEC 9	2	ARC-c	1[Note 1]	ARC-b
Note 1: The reference environment for assessing density is AEC 10 (OPS < 4500 ft AGL over rural areas).				
AEC10 and AEC 11 are not included in this table, as any ARC reduction would result in ARC-a. A UAS operator claiming a reduction to ARC-a should demonstrate that all the requirements that define atypical or segregated airspace have been met.				

Table C.2 — Reduced air risk class

[…]

Example 3:

A UAS operator is intending to operate below 4500 ft AGL, in a class G (uncontrolled) airspace, over an urbanised area, with a corresponding level of AEC 9.

The UAS operator enters the initial ARC reduction table at Row AEC 9. Column A indicates that the generalised airspace density rating corresponding with this environment is 2. Column B shows that the associated initial ARC is ARC-c. Column C indicates that if a UAS operator demonstrates that the local airspace density corresponds more to a density rating of 1, namely AEC 10, then the residual ARC level may be reduced to ARC-b (Column D).

C.6.3 Lowering the initial ARC by common structures and rules (optional)

Today, aviation airspace rules and structures mitigate the risk of collision. As the airspace risk increases, more structures and rules are implemented to reduce the risk. In general, the higher the aircraft density, the higher the collision risk, and ~~the~~ more structures and rules are required to reduce the collision risk.

In general, manned aircraft do not use very low level (VLL) airspace, as it is below the minimum safe height to perform an emergency procedure, 'unless at such a height as will permit, in the event of an emergency arising, a landing to be made without undue hazard to persons or property on the surface' (Ref. point SERA.3105 of the SERA Regulation). Subject to permission from the competent authority, special flights may be granted permission to use this airspace. Every aircraft will cross VLL airspace in an airport environment for take-off and landing.

With the advent of UAS operations, VLL airspace is expected to soon become more crowded, requiring more common structures and rules to lower the collision risk. It is anticipated that U-space services will provide these risk mitigation measures. This will require mandatory participation by all aircraft in that airspace, similar to how the current flight rules apply to all manned aircraft operating in a particular airspace today.

The SORA does not allow the initial ARC to be lowered through strategic mitigation by common structures and rules for all operations in AEC 1, 2, 3, 4, 5, and 11~~.~~[32]. Outside the scope of the SORA, a UAS operator may appeal to the competent authority to lower the ARC by strategic mitigation by using common structures. The determination of acceptability falls under the normal airspace rules, regulations and safety requirements for ATM/ANS providers.

Similarly, the SORA does not allow for lowering the initial ARC through strategic mitigation by using common structures and rules for all operations in AEC 10[33].

The maximum amount of ARC reduction through strategic mitigation by using common structures and rules is by one ARC level.

The SORA does allow for lowering the initial ARC through strategic mitigation by structures and rules for all operations below ~~4~~500 ft AGL within VLL airspace (AECs 7, 8, 9 and 10).

[…]

[32] AEC 1, 2, 3, 4, and 5 already have manned airspace rules and structures defined by Regulation (EU) No 923/2012. Any UAS operating in these types of airspace shall comply with the applicable airspace rules, regulations and safety requirements. As such, no lowering of the ARC by common structures and rules is allowed, as those mitigations have already been accounted for in the assessment of those types of airspace. Lowering the ARC for rules and structures in AEC 1, 2, 3, 4, 5, and 11 would amount to double counting of the mitigations.

[33] AEC 10: the initial ARC is ARC-b. To lower the ARC in these volumes of airspace (to ARC-a) requires the operational volume to meet one of the requirements of atypical/segregated ~~A~~airspace.

Annex E to AMC1 to Article 11

INTEGRITY AND ASSURANCE LEVELS FOR THE OPERATIONAL SAFETY OBJECTIVES (OSOs)

[…]

E.2 OSOs related to technical issues with the UAS

[…]

TECHNICAL ISSUE WITH THE UAS		Level of assurance		
		Low	**Medium**	**High**
OSO #01 Ensure that the UAS operator is competent and/or proven	Criteria	The elements delineated in the level of integrity are addressed in the ConOps.	Prior to the first operation, ~~a~~the competent authority of the MS or an entity that is designated by the competent authority~~third party~~ performs an audit of the organisation.	The applicant holds an organisational operating certificate or has a recognised flight test organisation. In addition, the competent authority of the MS or an entity that is designated by the~~a~~ competent authority~~third party~~ verifies the UAS operator's competences.
	Comments	~~N/A~~*n/a*	~~N/A~~*n/a*	~~N/A~~*n/a*

OSO #02 — UAS designed and produced by a competent and/or proven entity

TECHNICAL ISSUE WITH THE UAS		Level of integrity		
		Low	**Medium**	**High**
OSO #02 UAS ~~manufactured~~ designed and produced by a competent and/or proven entity	Criteria for design	As a minimum, design covers: (a) the specification of the materials; and (b) the suitability and durability of the materials used.	Same as low. In addition, design procedures also cover: (a) the configuration control; and (b) identification and traceability.	The design organisation complies with Subpart J of Annex I (Part 21) to Regulation (EU) No 748/2012.

	Criteria for production	As a minimum, ~~manufacturing~~production procedures cover~~:~~ ~~(a) the specification of materials;~~ ~~(b) the suitability and durability of materials used; and~~ ~~(c)~~ the processes necessary to allow for repeatability in manufacturing, and conformity within acceptable tolerances.	Same as low. In addition, ~~manufacturing~~production procedures also cover: (a) the configuration control; (b) the verification of incoming products, parts, materials, and equipment; (c) identification and traceability; (d) in-process and final inspections & testing; (e) the control and calibration of tools; (f) handling and storage; and (g) the control of non-conforming items.	The ~~manufacturer~~production organisation complies with the organisational requirements that are defined in Subpart G of Annex I (Part 21) to Regulation (EU) No 748/2012.
	Comments	~~N/A~~*n/a*	~~N/A~~*n/a*	~~N/A~~*n/a*

TECHNICAL ISSUE WITH THE UAS		**Level of assurance**		
		Low	**Medium**	**High**
OSO #02 UAS ~~manufactured~~ designed and produced by a competent and/or proven entity	Criteria for design	The declared design procedures are developed to a standard that is considered adequate by the competent authority that issues the operational authorisation and/or in accordance with a means of compliance acceptable to that authority. The competent authority may request EASA to validate the claimed integrity.	Same as low. In addition, evidence is available that the UAS has been designed in accordance with design procedures. The competent authority may request EASA to validate the claimed integrity.	Same as medium. In addition, EASA validates compliance with the design organisational requirements that are defined in Subpart J of Annex I (Part 21) to Regulation (EU) No 748/2012.
	Criteria for production	The declared ~~manufacturing~~ production procedures are developed to a standard that is considered adequate by the competent authority that issues the operational authorisation and/or in accordance with a means of compliance acceptable to that authority. ~~The competent authority may request EASA to validate the claimed integrity.~~	Same as low. In addition, evidence is available that the UAS has been ~~manufactured~~produced in conformance with/to its design. ~~The competent authority may request EASA to validate the claimed integrity.~~	Same as medium. In addition~~:~~, the competent authority of the MS or an entity that is designated by the competent authority ~~EASA~~ validates compliance with the production organisational requirements that are defined in Subpart G of Annex I (Part 21) to Regulation (EU) No 748/2012.

	Comments	~~*N/A*~~*n/a*	~~*N/A*~~*n/a*	~~*N/A*~~*n/a*

OSO #03 — UAS maintained by competent and/or proven entity

[…]

TECHNICAL ISSUE WITH THE UAS		**Level of assurance**		
		Low	**Medium**	**High**
OSO #03 UAS maintained by a competent and/or proven entity (e.g. industry standards)	Criterion #1 (Procedure)	(a) The maintenance instructions are documented. (b) The maintenance conducted on the UAS is recorded in a maintenance log system[1/2]. (c) A list of the maintenance staff authorised to carry out maintenance is established and kept up to date.	Same as low. In addition: (a) The maintenance programme is developed in accordance with standards considered adequate by the competent authority of the MS and/or in accordance with a means of compliance acceptable to that authority. (b) A list of the maintenance staff with maintenance release authorisation is established and kept up to date.	Same as medium. In addition, the maintenance programme and the maintenance procedures manual are validated by the competent authority of the MS or by an entity that is designated by the ~~a~~ competent authority~~third party~~.
	Comments	*[1] The ~~O~~objective is to record all the maintenance performed on the aircraft, and why it is performed (rectification of defects or malfunctions, modifications, scheduled maintenance, etc.).* *[2] The maintenance log may be requested for inspection/audit by the approving authority or an authorised representative.*	~~*N/A*~~*n/a*	~~*N/A*~~*n/a*
	Criterion #2 (Training)	A record of all the relevant qualifications, experience and/or training completed by the maintenance staff is established and kept up to date.	Same as low. In addition: (a) The initial training syllabus and training standard, including theoretical/practical elements, duration, etc., is defined and is commensurate with the authorisation held by the maintenance staff.	Same as medium. In addition: (a) A programme for the recurrent training of staff holding a maintenance release authorisation is established; and (b) This programme is validated by the competent authority of the MS or by an entity that is

			(b) For staff that hold a maintenance release authorisation, the initial training is specific to that particular UAS model/family. (c) All maintenance staff have undergone initial training.	designated by the~~a~~ competent authority~~third party~~.
	Comments	~~*N/A*~~*n/a*	~~*N/A*~~*n/a*	~~*N/A*~~*n/a*

[…]

OSO #07 — Inspection of the UAS (product inspection) to ensure consistency with the ConOps

[…]

TECHNICAL ISSUE WITH THE UAS		**Level of assurance**		
		Low	**Medium**	**High**
OSO #07 Inspection of the UAS (product inspection) to ensure consistency with the ConOps	Criterion #1 (Procedures)	Product inspection is documented and accounts for the manufacturer's recommendations, if available.	Same as low. In addition, the product inspection is documented using checklists.	Same as medium. In addition, the product inspection is validated by the competent authority of the MS or by an entity that is designated by the~~a~~ competent authority~~third party~~.
	Comments	~~*N/A*~~*n/a*	~~*N/A*~~*n/a*	~~*N/A*~~*n/a*
	Criterion #2 (Training)	The remote crew is trained to perform the product inspection, and that training is self-declared (with evidence available).	(a) A training syllabus including a product inspection procedure is available. (b) The UAS operator provides competency-based, theoretical and practical training.	~~A~~The competent authority of the MS or an entity that is designated by the competent authority~~third party~~: (a) validates the training syllabus; and (b) verifies the remote crew competencies.
	Comments	~~*N/A*~~*n/a*	~~*N/A*~~*n/a*	~~*N/A*~~*n/a*

E.3 OSOs related to operational procedures

OPERATIONAL PROCEDURES		**Level of integrity**		
		Low	**Medium**	**High**
OSO #08, OSO #11, OSO #14 and OSO #21	Criterion #1 (Procedure definition)	(a) Operational procedures[1] appropriate for the proposed operation are defined and, as a minimum, cover the following elements: (1) Flight planning; (2) Pre- and post-flight inspections; (3) Procedures to evaluate the environmental conditions before and during the mission (i.e. real-time evaluation); (4) Procedures to cope with unexpected adverse operating conditions (e.g. when ice is encountered during an operation not approved for icing conditions); (5) Normal procedures; (6) Contingency procedures (to cope with abnormal situations); (7) Emergency procedures (to cope with emergency situations); (8) Occurrence-reporting procedures; and ~~Note: normal, contingency and emergency procedures are compiled in an OM.~~ (b) The limitations of the external systems supporting the UAS operation[2] are defined in an OM.		
	Comments	*[1] Operational procedures cover the deterioration~~3~~ of the UAS itself and any external system supporting the UAS operation.* *To properly address the deterioration of external systems required for the operation, it is recommended to:* *(a) identify these 'external systems';* *(b) identify the modes of deterioration of the 'external systems' (e.g. complete loss of GNSS, drift of the GNSS, latency issues, etc.) which would lead to a loss of control of the operation;* *(c) describe the means to detect these modes of deterioration of the external systems/facilities; and* *(d) describe the procedure(s) used when deterioration is detected (e.g. activation of the emergency recovery capability, switch to manual control, etc.).* *[2] In the scope of this assessment, external systems supporting the UAS operation are defined as systems that are not already part of the UAS but are used to:* *(a) launch/~~take-off~~take off the UA;* *(b) make pre-flight checks; or* *(c) keep the UA within its operational volume (e.g. GNSS, satellite systems, air traffic management, U-~~S~~space).* *External systems activated/used after a loss of control of the operation are excluded from this definition.* *~~[3] To properly address the deterioration of external systems required for the operation, it is recommended to:~~* *~~(a) identify these 'external systems';~~* *~~(b) identify the modes of deterioration of the 'external systems' (e.g. complete loss of GNSS, drift of the GNSS, latency issues, etc.) which would lead to a loss of control of the operation;~~*		

OPERATIONAL PROCEDURES		Level of integrity		
		Low	**Medium**	**High**
		~~*(c) describe the means to detect these modes of deterioration of the external systems/facilities; and*~~ ~~*(d) describe the procedure(s) used when deterioration is detected (e.g. activation of the emergency recovery capability, switch to manual control, etc.).*~~		
	Criterion #2 (Procedure complexity)	Operational procedures are complex and may potentially jeopardise the crew's ability to respond by increasing ~~raising~~ the remote crew's workload and/or their interaction~~s~~ with other entities (e.g. ATM, etc.).	Contingency/emergency procedures require manual control by the remote pilot[2] when the UAS is usually automatically controlled.	Operational procedures are simple.
	Comments	~~*N/A*~~*n/a*	~~*[2] This is still under discussion since not all UAS have a mode where the pilot could directly control the surfaces; moreover, some people claim it requires significant skill not to make things worse.*~~ *n/a*	~~*N/A*~~*n/a*
	Criterion #3 (Consideration of Potential Human Error)	At a minimum, operational procedures provide: (a) a clear distribution and assignment of tasks, and (b) an internal checklist to ensure staff are adequately performing their assigned tasks.	Operational procedures take human error into consideration.	Same as medium. In addition, the remote crew[3] receives crew resource management (CRM)[4] training.
	Comments	~~*N/A*~~*n/a*	~~*N/A*~~*n/a*	*[3] In the context of the SORA, the term 'remote crew' refers to any person involved in the mission.* *[4] CRM training focuses on the effective use of all the remote crew to ensure safe and efficient operation, reducing error, avoiding stress and increasing efficiency.*

OPERATIONAL PROCEDURES		**Level of assurance**		
		Low	**Medium**	**High**
OSO #08, OSO #11, OSO #14 and OSO #21	Criteria	(a) Operational procedures ~~do~~are not ~~require~~ validated~~ion~~ against either a standard or a means of compliance that is considered adequate by the competent authority of the MS. (b) The adequacy of the operational procedures is declared, except for emergency procedures, which are tested.	(a) Normal, contingency, and emergency procedures are documented and compiled in an operations manual (OM). ~~(a)~~(b) Operational procedures are validated against standards considered adequate by the competent authority of the MS and/or in accordance with the means of compliance acceptable to that authority[1]. ~~(b)~~(c) The ~~A~~adequacy of the procedures is proven through: (1) dedicated flight tests; or (2) simulation, provided that the representativeness of the simulation means is proven valid for the intended purpose with positive results~~.~~; or (3) any other means acceptable to the competent authority.	Same as medium. In addition: (a) Flight tests performed to validate the procedures and checklists cover the complete flight envelope or are proven to be conservative. (b) The procedures, checklists, flight tests and simulations are validated by the competent authority of the MS or by an entity that is designated by the~~a~~ competent authority~~third party~~.
	Comments	~~N/A~~*n/a*	~~N/A~~[1] *AMC2 UAS.SPEC.030(3)(e) (Operational procedures for medium and high levels of robustness) is considered an acceptable means of compliance.*	

E.4 OSOs related to remote crew training

[…]

REMOTE CREW COMPETENCIES		Level of assurance		
		Low	**Medium**	**High**
OSO #09, OSO #15 and OSO #22	Criteria	Training is self-declared (with evidence available).	(a) Training syllabus is available. (b) The UAS operator provides competency-based, theoretical and practical training.	The competent authority of the MS or an entity that is designated by the~~A~~ competent authority~~third party~~: (a) validates the training syllabus; and (b) verifies the remote crew competencies.
	Comments	~~N/A~~*n/a*	~~N/A~~*n/a*	~~N/A~~*n/a*

[…]

E.6 OSOs related to the deterioration of external systems supporting UAS operations

For the purpose of the SORA and this specific OSO, the term 'external services supporting UAS operations' encompasses any service providers necessary for the safety of the flight, such as communication service providers (CSPs) and U-space service providers[34].

[…]

DETERIORATION OF EXTERNAL SYSTEMS SUPPORTING UAS OPERATIONS BEYOND THE CONTROL OF THE UAS		**Level of assurance**		
		Low	**Medium**	**High**
OSO #13 External services supporting UAS operations are adequate for the operation	Criteria	The applicant declares that the requested level of performance for any externally provided service necessary for the safety of the flight is achieved (without evidence being necessarily available).	The applicant has supporting evidence that the required level of performance for any externally provided service required for the safety of the flight can be achieved for the full duration of the mission. This may take the form of a service-level agreement (SLA) or any official commitment that prevails between a service provider and the applicant on the relevant aspects of the service (including quality, availability, and responsibilities). The applicant has a means to monitor externally provided services which affect flight-critical systems and take appropriate actions if real-time	Same as medium. In addition: (a) the evidence of the performance of an externally provided service is achieved through demonstrations; and (b) the competent authority of the MS or an entity that is designated by the~~a~~ competent authority~~third party~~ validates the claimed level of integrity.

[34] Examples of external services are:
- provision of geographical data and geographical limitations;
- collection and transfer of occurrence data;
- training and assessment of remote pilots;
- communication services that support the C2 link and any other safety-related communication;
- services that support navigation, e.g. GNSS services (typically, most UAS operations use an 'open service', in which case the requirement of point UAS.STS-01.030(6) is not applicable);
- provisions of services related to flight planning and management, including related safety assessments; and
- U-space services, which are defined in the corresponding regulation(s) and may include one or more of the above-mentioned services.

			performance could lead to the loss of control of the operation.	
	Comments	~~N/A~~*n/a*	~~N/A~~*n/a*	~~N/A~~*n/a*

E.7 OSOs related to Human Error

[…]

HUMAN ERROR		**Level ~~LEVEL~~ of assurance~~ASSURANCE~~**		
		Low	**Medium**	**High**
OSO #16 Multi-crew coordination	Criterion #1 (Procedures)	(a) Procedures ~~do~~are not ~~require~~ validated~~ion~~ against either a standard or a means of compliance considered adequate by the competent authority of the MS. (b) The adequacy of the procedures and checklists is declared.	(a) Procedures are validated against standards considered adequate by the competent authority of the MS and/or in accordance with the means of compliance acceptable to that authority[1]. (b) The~~A~~adequacy of the procedures is proven through: (1) dedicated flight tests; or (2) simulation, provided that the representativeness of the simulation means is proven for the intended purpose with positive results~~.~~; or (3) any other means acceptable to the competent authority.	Same as medium. In addition: (a) flight tests performed to validate the procedures cover the complete flight envelope or are proven to be conservative; and (b) the procedures, flight tests and simulations are validated by the competent authority of the MS or an entity designated by the~~a~~ competent authority~~third party~~.
	Comments	~~N/A~~*n/a*	~~N/A~~[1] *AMC2 UAS.SPEC.030(3)(e) (Operational procedures for medium and high levels of robustness) is considered an acceptable means of compliance.*	~~N/A~~*n/a*
	Criterion #2 (Training)	Training is self-declared (with evidence available).	(a) Training syllabus is available. (b) The UAS operator provides competency-based, theoretical and practical training.	The competent authority of the MS or an entity that is designated by the~~A~~ competent authority~~third party~~: (a) validates the training syllabus; and

HUMAN ERROR		Level ~~LEVEL~~ of assurance ~~ASSURANCE~~		
		Low	**Medium**	**High**
				(b) verifies the remote crew competencies.
	Comments	~~N/A~~*n/a*	~~N/A~~*n/a*	~~N/A~~*n/a*
	Criterion #3 (Communication devices)	Consider the criteria defined in Section 9		
	Comments	~~N/A~~*n/a*	~~N/A~~*n/a*	~~N/A~~*n/a*

OSO #17 — Remote crew is fit to operate

[…]

HUMAN ERROR		Level ~~LEVEL~~ of assurance ~~ASSURANCE~~		
		Low	**Medium**	**High**
OSO #17 Remote crew is fit to operate	Criteria	The policy to define how the remote crew declares themselves fit to operate (before an operation) is documented. The remote crew fit-to-operate declaration ~~of fit to operate~~ (before an operation) is based on a policy defined by the applicant.	Same as ~~L~~low. In addition: — Remote crew duty, flight duty and the resting time~~s~~ policy are documented. — Remote crew duty cycles are logged and cover at a minimum: — when the remote crew member's duty day commences, — when the remote crew members are free from duties, and — resting times within the duty cycle. — There is evidence that the remote crew is fit to operate the UAS.	Same as ~~M~~medium. In addition: — Medical standards considered adequate by the competent authority and/or the means of compliance acceptable to that authority are established and the competent authority of the MS or an entity that is designated by the~~a~~ competent authority~~third party~~ verifies that the remote crew is medically fit. — The competent authority of the MS or an entity that is designated by the~~A~~ competent authority~~third party~~ validates the duty/flight duty times. — If an FRMS is used, it is validated and monitored by the competent

				authority of the MS or an entity that is designated by the~~a~~ competent authority~~third party~~.
	Comments	~~N/A~~*n/a*	~~N/A~~*n/a*	~~N/A~~*n/a*

[…]

HUMAN ERROR		**Level~~LEVEL~~ of assurance~~ASSURANCE~~**		
		Low	**Medium**	**High**
OSO #19 Safe recovery from Human Error	Criterion #1 (Procedures and checklists)	–(a) Procedures and checklists ~~do~~are not ~~require~~ validated~~ion~~ against either a standard or a means of compliance considered adequate by the competent authority of the MS. –(b) The adequacy of the procedures and checklists is declared.	–(a) Procedures and checklists are validated against standards considered adequate by the competent authority of the MS and/or in accordance with the means of compliance acceptable to that authority[1]. –(b) The~~A~~adequacy of the procedures and checklists is proven through: –(1) dedicated flight tests; or –(2) simulation, provided that the representativeness of the simulation means is proven for the intended purpose with positive results~~.~~; or –(3) any other means acceptable to the competent authority of the MS.	Same as ~~M~~medium. In addition: –(a) Flight tests performed to validate the procedures and checklists cover the complete flight envelope or are proven to be conservative. –(b) The procedures, checklists, flight tests and simulations are validated by the competent authority of the MS or an entity that is designated by the~~a~~ competent authority~~third party~~.
	Comments	~~N/A~~*n/a*	~~N/A~~[1] *AMC2 UAS.SPEC.030(3)(e) (Operational procedures for medium and high levels of robustness) is considered an acceptable means of compliance.*	~~N/A~~*n/a*
	Criterion #2 (Training)	Consider the criteria defined for the level of assurance of the generic remote crew training OSO (i.e. OSO #09, OSO #15 and OSO #22) corresponding to the SAIL of the operation.		

HUMAN ERROR		Level~~LEVEL~~ of assurance~~ASSURANCE~~		
		Low	**Medium**	**High**
	Comments	*~~N/A~~n/a*	*~~N/A~~n/a*	*~~N/A~~n/a*
	Criterion #3 (UAS design)	Consider the criteria defined in Section 9.		
	Comments	*~~N/A~~n/a*	*~~N/A~~n/a*	*~~N/A~~n/a*

[…]

HUMAN ERROR		Level~~LEVEL~~ of assurance~~ASSURANCE~~		
		Low	**Medium**	**High**
OSO #20 A Human Factors evaluation has been performed and the HMI found appropriate for the mission	Criteria	The applicant conducts a human factors evaluation of the UAS to determine whether the HMI is appropriate for the mission. The HMI evaluation is based on inspection or analyses.	Same as ~~L~~low but the HMI evaluation is based on demonstrations or simulations~~.~~[1].	Same as ~~M~~medium. In addition, EASA witnesses the HMI evaluation of the UAS and the competent authority of the MS or an entity that is designated by the~~a~~ competent authority~~third party~~ witnesses the HMI evaluation of the possible electronic means used by the VO.
	Comments	*~~N/A~~n/a*	*[1] When simulation is used, the validity of the targeted environment used in the simulation needs to be justified.*	*~~N/A~~n/a*

E.8 OSOs related to Adverse Operating Conditions

[…]

ADVERSE OPERATING CONDITIONS		Level~~LEVEL~~ of assurance~~ASSURANCE~~		
		Low	**Medium**	**High**
OSO #23 Environmental conditions for safe operations defined, measurable and adhered to	Criterion #1 (Definition)	Consider the criteria defined in Section 9.		
	Comments	*~~N/A~~n/a*		
	Criterion #2 (Procedures)	–(a) Procedures ~~do~~are not ~~require~~ validated~~ion~~ against either a standard or a means of compliance considered adequate by the competent authority of the MS. –(b) The adequacy of the procedures and checklists is declared.	–(a) Procedures are validated against standards considered adequate by the competent authority of the MS and/or in accordance with the means of compliance acceptable to that authority[1]. –(b) The ~~A~~adequacy of the procedures and checklists is proven through: –(1) dedicated flight tests; or –(2) simulation, provided that the representativeness of the simulation means is proven for the intended purpose with positive results~~.~~; or –(3) any other means acceptable to the competent authority of the MS.	Same as ~~M~~medium. In addition: –(a) Flight tests performed to validate the procedures cover the complete flight envelope or are proven to be conservative. –(b) The procedures, flight tests and simulations are validated by the competent authority of the MS or an entity that is designated by the~~a~~ competent authority~~third party~~.
	Comments	*~~N/A~~n/a*	*~~N/A~~[1] AMC2 UAS.SPEC.030(3)(e) (Operational procedures for medium and high levels of robustness) is considered an acceptable means of compliance.*	*~~N/A~~n/a*
	Criterion #3 (Training)	Training is self-declared (with evidence available).	– Training syllabus is available. – The UAS operator provides competency-based, theoretical and practical training.	The competent authority of the MS or an entity that is designated by the~~A~~ competent authority~~third party~~:

				– ~~V~~validates the training syllabus~~.~~; and – ~~V~~verifies the remote crew competencies.
	Comments	~~N/A~~*n/a*	~~N/A~~*n/a*	~~N/A~~*n/a*

[…]

E.9 Assurance level criteria for technical OSO

		Level~~LEVEL~~ of assurance~~ASSURANCE~~		
		Low	**Medium**	**High**
TECHNICAL OSO	Criteria	The applicant declares that the required level of integrity has been achieved[1]. The competent authority may request EASA to validate the claimed integrity.	The applicant has supporting evidence that the required level of integrity has been ~~is~~ achieved. This is typically done by testing, analysis, simulation[2], inspection, design review or through operational experience. The competent authority may request EASA to validate the claimed integrity.	EASA validates the claimed level of integrity.
	Comments	*[1] Supporting evidence may or may not be available.*	*[2] When simulation is performed, the validity of the targeted environment that is used in the simulation needs to be justified.*	~~N/A~~*n/a*

AMC2 Article 11 Rules for conducting an operational risk assessment

PREDEFINED RISK ASSESSMENT PDRA-G01 Version 1.2~~1~~

EDITION ~~December 2020~~Month YEAR

[…]

(b) PDRA characterisation and ~~provisions~~ conditions

The characterisation and conditions~~provisions~~ for this PDRA are summarised in **Table PDRA-G01.1** below:

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [35]**	**Demonstration of assurance[35]**
1. Operational characterisation (scope and limitations)				
Level of human intervention	Low	1.1 No autonomous operations: the remote pilot should have the ability to maintain control of the UA, except in case of a loss of the command and control (C2) link.		
		1.2 The remote pilot should operate only one UA at a time.		
		1.3 The remote pilot should not operate from a moving vehicle.		
		1.4 The remote pilot should not hand ~~over~~ the control of the UA over to another command unit.		
UA range limit	Low	1.5 Launch/recovery: at VLOS distance from the remote pilot, if not operating from a safe prepared area. *Note: 'safe prepared area' means a controlled ground area that is suitable for the safe launch/recovery of the UA.*		

[35] To be filled in by the UAS operator.

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [35]**	**Demonstration of assurance[35]**
		1.6 In flight:		
		1.6.1 If no AOs are employed: the UA is not operated further than 1 km (or other distance defined by the competent authority) from the remote pilot. *Note: The remote pilot's workload should allow the remote pilot to continuously scan the airspace.*		
		1.6.2 If AOs are employed: the range is not limited as long as the UA is not operated further than 1 km (unless a different distance is defined by the competent authority) from the AO who is nearest to the UA.		
Areas overflown	Low	1.7 UAS operations should be conducted over sparsely populated areas.		
UA limitations	Low	1.8 Maximum characteristic dimension (e.g. wingspan, rotor diameter/area or maximum distance between rotors in case of a multirotor): 3 m		
		1.9 Typical kinetic energy (as defined in paragraph 2.3.1(k) of AMC1 Article 11 of the UAS Regulation: up to 34 kJ		
Flight height limit	Low	1.10 The maximum height of the operational volume should not be greater than 150 m (500 ft) above the overflown surface (or any other altitude reference defined by the Member State). *Note: In addition to the vertical limit of the operational volume, an air risk buffer is to be considered (see 'Air risk' under point 3 of this table).*		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [35]**	**Demonstration of assurance[35]**
Airspace	Low	1.11 The UA should be operated:		
		1.11.1 in uncontrolled airspace (Class F or G) (corresponding to an air risk that can be classified as ARC-b); or		
		1.11.2 in a segregated area (corresponding to an air risk that can be classified as ARC-a); or		
		1.11.3 as otherwise established by the Member States in accordance with Article 15 (with an associated air risk that can be classified as not higher than ARC-b).		
Visibility	Low	1.12 The UA should be operated in an area where flight visibility is greater ~~more~~ than 5 km. *Note: This flight visibility should be understood as the distance from which a UA can be visually detected by the remote crew.*		
Others	Low	1.13 The UA should not be used to carry dangerous goods, except for dropping items in connection with agricultural, horticultural or forestry activities in which the carriage of the items does not contravene any other applicable regulations.		
2. Operational risk classification (according to the classification defined in AMC1 Article 11 of the UAS Regulation)				
Final GRC	3	**Final ARC**	ARC-b	**SAIL** II
3. Operational mitigations				
Operational volume (see Figure 2 of AMC1 Article 11)	Low	3.1 To determine the operational volume, the applicant should consider the position-keeping capabilities of the UAS in 4D space (latitude, longitude, height, and time).		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [35]**	**Demonstration of assurance[35]**
		3.2 In particular, the accuracy of the navigation solution, the flight technical error of the UAS, as well as the flight path definition error (e.g. map error) and latencies should be considered and addressed when determining the operational volume.		
		3.3 The remote pilot should apply emergency procedures as soon as there is an indication that the UA may exceed the limits of the operational volume.		
Ground risk	Low	3.4 The UAS operator should establish a ground risk buffer to protect third parties on the ground outside the operational volume.		
		3.4.1 The minimum criterion should be the use of the '1:1 rule' (e.g. if the UA is planned to operate at a height of 150 m, the ground risk buffer should at least be 150 m).		
		3.5 The operational volume and the ground risk buffer should be all contained in a sparsely populated area.		
		3.6 The applicant should evaluate the area of operations typically by means of an on-site inspection or appraisal, and should be able to justify a lower density of people at risk.		
Air risk	Low	3.7 The UAS operator should establish an air risk buffer to protect third parties in the air outside the operational volume.		
		3.8 This air risk buffer should be contained in the 'airspace class F or G' (uncontrolled airspace) over sparsely		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [35]**	**Demonstration of assurance[35]**
		populated areas and in UAS geographical zones defined by the MSs where the probability of encounter with manned aircraft and other airspace users is not low.		
		3.9 The operational volume should be outside any geographical zone corresponding to a flight restriction zone, as defined by the responsible authority, unless the UAS operator has been granted ~~an~~ appropriate permission.		
		3.10 Prior to the flight, the remote pilot should assess the proximity of the planned operation to manned aircraft activity.		
Observers	Low	3.11 If the UAS operator decides to employ one or more airspace observers (AOs), the remote pilot may operate the UA up to the distance that is specified in point 1.6.2.		
		3.12 The UAS operator should ensure the correct placement and number of AOs along the intended flight path. Prior to each flight, the UAS operator should verify that:		
		3.12.1 the visibility and the planned distance of the AOs are within acceptable limits that are defined in the operations manual (OM);		
		3.12.2 there are no potential terrain obstructions for each AO;		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [35]**	**Demonstration of assurance[35]**
		3.12.3 ~~that~~ there are no gaps between the zones that are covered by each of the AOs.		
		3.12.4 communication with each AO is established and effective; and		
		3.12.5 if means are used by the AOs to determine the position of the UA, those means are functioning and effective. *Note: Instead of an AO, the remote pilot may perform the visual scan of the airspace, provided that the workload allows the remote pilot to perform their duties.*		
4. UAS operator and UAS operations conditions~~provisions~~				
UAS operator and UAS operations	Medium	4.1 In addition to the responsibilities that are defined in point UAS.SPEC.050 of the Annex to the UAS Regulation and the conditions~~provisions~~ for UAS operators in previous points of this AMC, the UAS operator should:		
		4.1.1 develop an operations manual (OM) (for the template, refer to AMC1 UAS.SPEC.030(3)(e) and to the complementary information in GM1 UAS.SPEC.030(3)(e));		
		4.1.2 develop an emergency response plan (ERP) ~~(see point 7 of GM1 UAS.SPEC.030(3)(e))~~ in accordance with the conditions for a 'medium' level of robustness, which are included in AMC3 UAS.SPEC.030(3)(e);		
		4.1.3 validate the operational procedures ~~against standards that are~~		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [35]**	**Demonstration of assurance[35]**
		~~recognised by the competent authority and/or in accordance with a means of compliance acceptable to that authority~~ in accordance with the conditions for a 'medium' level of robustness, which are included in AMC2 UAS.SPEC.030(3)(e);		
		4.1.4 ensure the adequacy of the contingency and emergency procedures and prove ~~them~~it through any of the following:		
		(a) dedicated flight tests; or		
		(b) simulations, provided that the representativeness of the simulation means is proven for the intended purpose with positive results; or		
		(c) any other means acceptable to the competent authority; and		
		4.1.5 have a policy that defines how the remote pilot and ~~all~~any other personnel in charge of duties essential to the UAS operation can declare themselves fit to operate before conducting any operation.		
UAS maintenance	Low	4.2 In addition to the responsibilities defined in point UAS.SPEC.050 and the provisions for UAS operators in previous points, the UAS operator should ensure that:		
		4.2.1 ~~T~~the UAS maintenance instructions that are defined by the UAS operator ~~should be~~are included in the OM and		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [35]**	**Demonstration of assurance[35]**
		cover at least the UAS manufacturer's instructions and requirements, when applicable.		
		4.~~3~~2.2 ~~T~~the maintenance staff ~~should~~ follow the UAS maintenance instructions when performing maintenance.		
External services	Low	4.~~4~~3 The UAS operator should ensure that the level of performance for any externally provided service that is necessary for the safety of the flight is adequate for the intended operation. The UAS operator should declare that this level of performance is adequately achieved.		
		4.~~5~~4 The UAS operator should define and allocate the roles and responsibilities between the UAS operator and the external service provider(s), if applicable.		
5. Conditions~~Provisions~~ for the personnel in charge of duties essential to the UAS operation				
	~~As per Appendix A to AMC2 Article 11 *The personnel in charge of duties essential to the UAS operation*~~			
General	Low	5.1 The UAS operator should ensure that all personnel in charge of duties essential to the UAS operation are provided with competency-based, theoretical and practical training specific to their duties, which consists of the applicable theoretical elements derived from AMC1 UAS.SPEC.050(1)(d) and practical elements from AMC2 UAS.SPEC.050(1)(d) and UAS.SPEC.050(1)(e). In addition, for non-remote pilots, also from AMC3 UAS.SPEC.050(1)(d).		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [35]**	**Demonstration of assurance[35]**
		5.2 The training programme should be documented and at least the training syllabus should be available.		
		5.3 Evidence of training should be presented for inspection at the request of the competent authority or its authorised representative.		
Remote pilot	Low	5.4 The remote pilot should have the authority to cancel or delay any or all flight operations under the following conditions:		
		5.4.1 the safety of persons is jeopardised; or		
		5.4.2 property on the ground is jeopardised; or		
		5.4.3 other airspace users are in jeopardy; or		
		5.4.4 there is a violation of the terms of the remote pilot's authorisation.		
		5.5 If AOs are employed, the remote pilot should ensure that the necessary AOs are available and correctly placed, and that the communication with them can be adequately established.		
		5.6 The remote pilot should ensure that:		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [35]**	**Demonstration of assurance[35]**
		5.6.1 the UA remains clear of clouds; and		
		5.6.2 the AO can perform unaided visual scanning of the airspace, as required, to avoid any potential collision hazard.		
Multi-crew cooperation (MCC)	Low	Where multi-crew cooperation (MCC) may be required, the UAS operator should:		
		5.7 designate the remote pilot to be responsible for each flight;		
		5.8 include procedures to ensure coordination between the remote crew members through robust and effective communication channels; those procedures should cover, as a minimum:		
		5.8.1 the assignment of tasks to the remote crew members; and		
		5.8.2 the establishment of step-by-step communication; and		
		5.9 ensure that the training of the remote crew covers MCC.		
Maintenance staff	Low	5.10 Any staff member that is authorised by the UAS operator to perform maintenance activities should have been adequately trained in the documented maintenance procedures.		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [35]**	**Demonstration of assurance[35]**
		5.11 Evidence of training should be presented for inspection at the request of the competent authority or its authorised representative.		
		5.12 The UAS operator may declare that the maintenance team has received training in the documented maintenance procedures. However, evidence of this training should be made available at the request of the competent authority or its authorised representative.		
Personnel in charge of duties essential to the UAS operation are fit to operate	Low	5.13 The UAS operator should have a policy that defines how the personnel in charge of duties essential to the UAS operation can declare themselves fit to operate before conducting any operation.		
		5.14 The personnel in charge of duties essential to the UAS operation should declare that they are fit to operate before conducting any operation, based on the policy that is defined by the UAS operator.		
6. Technical conditions~~provisions~~				
General	Low	6.1 The UAS should be equipped with means to monitor the critical parameters of a safe flight, in particular the:		
		6.1.1 UA position, height or altitude, ground speed or airspeed, attitude and trajectory;		
		6.1.2 UAS energy status (fuel, battery charge, etc.); and		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [35]**	**Demonstration of assurance[35]**
		6.1.3 status of critical functions and systems; as a minimum, for services based on RF signals (e.g. C2 Link, GNSS, etc.), means should be provided to monitor the adequate performance and trigger an alert if the level becomes too low.		
		6.2 The UA should have the performance capability to descend safely from its operating altitude to a 'safe altitude' in less than 1 minute, or have a descent rate of at least 2.5 m/s (500 fpm).		
Human-machine interface (HMI)	Low	6.3 The UAS information and control interfaces should be clearly and succinctly presented and should not confuse, cause unreasonable fatigue, or contribute to causing any disturbance to the personnel in charge of duties essential to the UAS operation in such a way that could adversely affect the safety of the operation.		
		6.4 If an electronic means is used to support AOs in their role of maintaining awareness of the position of the UA~~unmanned aircraft~~, its HMI should:		
		6.4.1 be sufficiently easy to understand to allow the AOs to determine the position of the UA during the operation; and		
		6.4.2 not degrade the AOs' ability to:		
		6.4.2.1 perform unaided visual scanning of the airspace where		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [35]**	**Demonstration of assurance[35]**
		the UA is operating for any potential collision hazard; and		
		6.4.2.2 maintain effective communication with the remote pilot at all times.		
		6.5 The UAS operator should conduct a UAS evaluation that considers and addresses human factors to determine whether the HMI is appropriate for the operation.		
C2 links and communication	Low	6.6 The UAS should comply with the applicable requirements for radio equipment and the use of the RF spectrum.		
		6.7 Protection mechanisms against interference should be used, especially if unlicensed bands (e.g. ISM) are used for the C2 link (mechanisms such as FHSS, DSSS or OFDM technolog~~y~~ies, or frequency de-confliction by procedure).		
		6.8 The UAS should be equipped with a C2 link that is protected against unauthorised access to the command and control functions.		
		6.9 In case of loss of the C2 link, the UAS should have a reliable and predictable method to recover the command and control link of the UA or to terminate the flight in a way that reduces any undesirable effect on third parties in the air or on the ground.		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [35]**	**Demonstration of assurance[35]**
		6.~~8~~10 Communication between the remote pilot and the AO(s) should allow the remote pilot to manoeuvre the UA with sufficient time to avoid any risk of collision with manned aircraft, in accordance with point UAS.SPEC.060(3)(b) of the UAS Regulation.		
Tactical mitigation		6.119~~9~~ The UAS design should be adequate to ensure that the time required between a command given by the remote pilot and the UA executing it does not exceed 5 seconds.		
	Low	6.120~~0~~ Where an electronic means is used to assist the remote pilot and/or AOs in being aware of the UA position in relation to potential 'airspace intruders', the information is provided with a latency and an update rate for intruder data (e.g. position, speed, altitude, track) that support the decision criteria.		
Containment		6.131~~1~~ To ensure a safe recovery from a technical issue that involves the UAS or an external system supporting the operation, the UAS operator should ensure that:		
	Medium	6.131~~1~~.1 no probable failure of the UAS or of any external system supporting the operation should lead to operation outside the operational volume; and		
		6.131~~1~~.2 it is reasonably expected that a fatality will not occur due to any probable failure of the UAS or of		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [35]**	**Demonstration of assurance[35]**
		any external system supporting the operation.		
		6.14~~2~~ The vertical extension of the operational volume should be 150 m above the surface (or any other reference altitude ~~reference~~ defined by the Member State). *Note: The term 'probable' should be understood in its qualitative interpretation, i.e. 'anticipated to occur one or more times during the entire system/operational life of an item'.*		
		6.15~~3~~ A design and installation appraisal should be made available and should cover at least:		
		6.15~~3~~.1 the design and installation features (independence, separation, and redundancy); and		
		6.15~~3~~.2 the particular risks (e.g. hail, ice, snow, electromagnetic interference, etc.) relevant to the ~~ConOps~~ type of operation.		
		6.16~~4~~ The following additional conditions~~provisions~~ should apply if the adjacent area includes an assembly of people or if the adjacent airspace is classified as ARC-d (in accordance with AMC1 Article 11 of the UAS Regulation):		
		6.16~~4~~.1 The UAS should be designed to standards that are considered adequate by the competent authority and/or in accordance with a means of compliance that is		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [35]**	**Demonstration of assurance[35]**
		acceptable to that competent authority such that:		
		6.164.1.1. the probability of the UA leaving the operational volume should be less than 10^{-4}~~$^{-4}$~~/FH; and		
		6.164.1.2 no single failure of the UAS or of any external system supporting the operation should lead to operation outside the ground risk buffer. *Note: The term 'failure' should be understood as an occurrence that affects the operation of a component, part, or element in such a way that it can no longer function as intended. Errors may cause failures but are not considered to be failures. Some structural or mechanical failures may be excluded from this criterion if it can be shown that these mechanical parts were designed according to aviation industry best practices.*		
		6.164.2 SW and AEH whose development error(s) could directly lead to operations outside the ground risk buffer should be developed according to an industry standard or methodology that are recognised as adequate by the competent authority. *Note 1: The proposed additional safety conditions~~provisions~~ cover both the integrity and the assurance levels.*		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [35]**	**Demonstration of assurance[35]**
		Note 2: The proposed additional safety conditions~~provisions~~ do not imply a systematic need to develop the SW and AEH according to an industry standard or methodology that is~~are~~ recognised as adequate by the competent authority. For instance, if the UA design includes an independent engine shutdown function that systematically prevents the UA from exiting the ground risk buffer due to single failures or a SW/AEH error of the flight controls, the intent of the conditions~~provisions~~ of point 6.164~~.~~.1 above could be considered to be met.		
		6.175~~.~~ Compliance with the conditions~~provisions~~ of points 6.164.1 and 6.164~~.~~.2 above should be substantiated by analysis and/or test data with supporting evidence.		
Remote identification	Low	6.18 According to Article 40(4) of Regulation (EU) 2019/945, the UAS 'shall have a unique serial number compliant with standard ANSI/CTA-2063-A-2019, *Small Unmanned Aerial Systems Serial Numbers*, 2019'.		
		6.18 According to Article 40(5) of Regulation (EU) 2019/945, the UAS 'shall be equipped with a remote identification system'.		

Table PDRA-G01.2 — Main limitations and conditions~~provisions~~ for PDRA-G01

~~Appendix A to AMC2 Article 11 The personnel in charge of duties essential to the UAS operation~~

~~The following are provisions applicable to UAS operators in relation to ensuring the proficiency, competency and clear duty assignment to the personnel in charge of duties essential to the UAS operation. UAS operators may decide to expand these requirements as applicable to its operation.~~

~~A.1 Training and qualifications for the personnel in charge of duties essential to the UAS operation~~

~~A.1.1 The UAS operator should ensure that all the personnel in charge of duties essential to the UAS operation (i.e. any people involved in the operation) are provided with competency-based theoretical and practical training specific to their duties that consists of the following elements:~~

~~A.1.1.2 The basic competencies from the competency framework that are necessary for staff to be adequate for the operation, to ensure safe flight, are as follows:~~

~~A.1.1.2.1 the UAS regulation,~~

~~A.1.1.2.2 UAS airspace operating principles,~~

~~A.1.1.2.3 airmanship and aviation safety,~~

~~A.1.1.2.4 human performance limitations,~~

~~A.1.1.2.5 meteorology,~~

~~A.1.1.2.6 navigation/charts,~~

~~A.1.1.2.7 UA knowledge,~~

~~A.1.1.2.8 operating procedures,~~

~~A.1.1.2.9 assignment of tasks to the crew,~~

~~A.1.1.2.10 establishment of step-by-step communications, and~~

~~A.1.1.2.11 coordination and handover.~~

~~A.1.1.3 Familiarisation with the 'specific' category of operations~~

~~A.1.1.3.1 The training programme should be documented (at least the training syllabus should be available).~~

~~A.1.1.3.2 Evidence of training should be presented for inspection upon request from the competent authority or authorised representative.~~

~~A.2. AOs~~

~~A.2.1 The AO's main responsibilities should be to:~~

~~A.2.1.1 maintain a thorough visual scan of the airspace that is surrounding the UA, to identify any risk of collision with manned aircraft;~~

~~A.2.1.2 maintain awareness of the position of the UA through direct visual observation or through assistance provided by an electronic means; and~~

~~A.2.1.3 alert the remote pilot if a hazard is detected and assist in avoiding or minimising the potential negative effects.~~

~~A.3 Remote pilot~~

~~A.3.1 The remote pilot has the authority to cancel or delay any or all flight operations under the following conditions:~~

~~A.3.1.1 the safety of persons is threatened; or~~

~~A.3.1.2 property on the ground is threatened; or~~

~~A.3.1.3 other airspace users are in jeopardy; or~~

~~A.3.1.4 there is a violation of the terms of this authorisation.~~

~~A.3.2 If VOs are used, then the remote pilot should ensure that the necessary VOs are available and correctly placed, and that the communications with them can be adequately performed.~~

~~A.3.3 The remote pilot should ensure that the UA remains clear of clouds, and that the ability of the remote pilot, or one of the VOs, to perform unaided visual scanning of the airspace where the unmanned aircraft is operating for any potential collision hazard is not hampered by clouds.~~

~~A.4. Multi-crew cooperation (MCC)~~

~~A.4.1 In applications where MCC might be required, the UAS operator should:~~

~~A.4.1.1 include procedures to ensure coordination between the remote crew members with robust and effective communication channels. Those procedures should cover as a minimum:~~

~~A.4.1.1.1 the assignment of tasks to the remote crew members; and~~

~~A.4.1.1.2 the establishment of step-by-step communication; and~~

~~A.4.1.2 ensure that the training of the remote crew covers MCC.~~

~~A.5. The remote crew is fit to operate~~

~~A.5.1 The UAS operator should have a policy defining how the remote crew can declare themselves fit to operate before conducting any operation.~~

~~A.5.2 The remote crew shall declare that they are fit to operate before conducting any operation based on the policy defined by the UAS operator.~~

~~A.6. Maintenance staff~~

~~A.6.1 Any staff member authorised by the UAS operator to perform maintenance activities should have been duly trained regarding the documented maintenance procedures.~~

~~A.6.2 Evidence of training should be presented for inspection upon request from the competent authority or authorised representative.~~

~~A.6.3 The UAS operator may declare that the maintenance team has received training regarding the documented maintenance procedures; however, evidence of this training shall be made available upon request from the competent authority or authorised representative.~~

AMC3 Article 11 Rules for conducting an operational risk assessment

PREDEFINED RISK ASSESSMENT PDRA-G02 Version 1.1~~0~~

EDITION ~~December 2020~~Month 2021

(a) Scope

This PDRA is the result of applying the methodology that is described in AMC1 to Article 11 of the UAS Regulation to UAS operations ~~performed~~ that are conducted in the 'specific' category with the following main attributes:

(1) UA with maximum characteristic dimensions (e.g. wingspan, rotor diameter/area or maximum distance between rotors in case of multirotor) of up to 3 m and typical kinetic energies of up to 34 kJ;

(2) ~~operated in~~ BVLOS of the remote pilot;

(3) over sparsely populated areas;

(4) within the range of the direct C2 link[36] at a height that is limited by the size of the reserved airspace; and

(5) in airspace that is reserved or restricted for the UAS operation~~: either a danger area or a restricted area appropriate for unmanned aircraft operations~~.

(b) PDRA characterisation and conditions~~provisions~~

[36] Due to the lack of experience in the use of communication services for extending the C2 link coverage through communication networks (e.g. mobile networks) in the type of UAS operations that are addressed by this PDRA, the scope of the PDRA is initially limited to the coverage of a direct C2 Link (direct link between the control station and the UA). As more experience in the use of those communication services is gained, the conditions of this PDRA may be revised to encompass their uses.

The characterisation and conditions~~provisions~~ for this PDRA are summarised in Table PDRA-G02.1 below.

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition~~Provision~~**	**Demonstration of integrity[37]**	**Demonstration of assurance[37]**
1. Operational characterisation (scope and limitations)				
Level of human intervention	Low	1.1 No autonomous operations: the remote pilot should have the ability to maintain control of the UA, except in case of a loss of the command and control (C2) link.		
		1.2 The remote pilot should operate only one UA at a time.		
		1.3 The remote pilot should not operate from a moving vehicle.		
		1.4 The remote pilot should not hand the control of the UA over to another command unit.		
UA range limit	Low	1.5~~3~~ Launch/recovery: ~~a~~At VLOS distance from the remote pilot, if not operating from a safe prepared area. *Note: 'safe prepared area' means a controlled ground area that is suitable for the safe launch/recovery of the UA.*		
		1.6~~4~~ In flight: The range limit should be within coverage of the direct C2 link, ~~coverage that~~which ensures the safe conduct of the flight.		
Areas overflown	Low	1.7~~5~~ UAS operations should be conducted over sparsely populated areas.		
UA limitations	Low	1.8~~6~~ Maximum characteristic dimension (e.g. wingspan, rotor diameter/area or maximum distance between rotors in case of a multirotor): 3 m		

[37] To be filled in by the UAS operator.

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition~~Provision~~**	**Demonstration of integrity[37]**	**Demonstration of assurance[37]**
		1.9~~7~~ Typical kinetic energy (as defined in paragraph 2.3.1(k) of AMC1 Article 11 of the UAS Regulation: up to 34 kJ		
Flight height limit	Low	1.10~~8~~ The maximum height of the operation volume is limited by the size of the reserved airspace. *Note: In addition to the vertical limit of the operational volume, an air risk buffer is to be considered (see 'Air risk' under point 3 of this table).*		
Airspace		1.11~~9~~ Operations should only be conducted in airspace that is reserved or restricted for the UAS operation (corresponding to an air risk that can be classified as ARC-a). ~~*Note: 'Reserved airspace' means here either a danger area or a restricted area that is designated for UAS operations.*~~		
Visibility	Low	1.12~~0~~ If take-off and landing are conducted in VLOS of the remote pilot, visibility should be sufficient to ensure that no people are in danger during the take-off/landing phase. The remote pilot should abort the take-off or landing in case people on the ground are in danger.		
Others	Low	1.13~~1~~ The UA should not be used to drop material or carry dangerous goods, except for dropping items in connection with agricultural, horticultural or forestry activities ~~in which~~where the carriage of the items does not		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition~~Provision~~**	**Demonstration of integrity[37]**	**Demonstration of assurance[37]**
		contravene any other applicable regulations.		
2. Operational risk classification (according to the classification defined in AMC1 Article 11 of the UAS Regulation)				
Final GRC	3	**Final ARC** ARC-b	**SAIL** II	
3. Operational mitigations				
Operational volume (see Figure 2 of AMC1 Article 11)	Low	3.1 To determine the operational volume, the applicant should consider the position-keeping capabilities of the UAS in 4D space (latitude, longitude, height, and time).		
		3.2 In particular, the accuracy of the navigation solution, the flight technical error of the UAS, as well as the flight path definition error (e.g. map error) and latencies should be considered and addressed when determining the operational volume.		
		3.3 The remote pilot should apply emergency procedures as soon as there is an indication that the UA may exceed the limits of the operational volume.		
Ground risk	Low	3.4 The UAS operator should establish a ground risk buffer to protect third parties on the ground outside the operational volume.		
		3.4.1 The minimum criterion should be the use of the '1:1 rule' (e.g. if the UA is planned to operate at a height of 150 m, the ground risk buffer should at least be 150 m).		
		3.5 The operational volume and the ground risk buffer should be all contained in a sparsely populated area.		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition~~Provision~~**	**Demonstration of integrity[37]**	**Demonstration of assurance[37]**
		3.6 The applicant should evaluate the area of operations typically by means of an on-site inspection or appraisal, and should be able to justify a lower density of people at risk.		
Air risk	Low	3.7 The operational volume should be entirely contained in the reserved or restricted airspace.		
Observers		~~N/A~~n/a		
4. UAS operator and UAS operations conditions~~provisions~~				
UAS operator and UAS operations	Medium	4.1 In addition to the responsibilities that are defined in point UAS.SPEC.050 of the Annex to the UAS Regulation and the conditions~~provisions~~ for UAS operators in previous points of this AMC, the UAS operator should:		
		4.1.1 develop an operations manual (OM) (for the template, refer to AMC1 UAS.SPEC.030(3)(e) and to the complementary information in GM1 UAS.SPEC.030(3)(e));		
		4.1.2 develop an emergency response plan (ERP) ~~(see point 7 of GM1 UAS.SPEC.030(3)(e))~~in accordance with the conditions for a 'medium' level of robustness, which are included in AMC3 UAS.SPEC.030(3)(e);		
		4.1.3 validate the operational procedures ~~against standards that are recognised by the competent authority and/or in accordance with a means of compliance acceptable to~~		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition~~Provision~~**	**Demonstration of integrity[37]**	**Demonstration of assurance[37]**
		~~that authority~~in accordance with the conditions for a 'medium' level of robustness, which are included in AMC2 UAS.SPEC.030(3)(e);		
		4.1.4 ensure the adequacy of the contingency and emergency procedures and prove ~~them~~it through any of the following:		
		(a) dedicated flight tests; or		
		(b) simulations, provided that the representativeness of the simulation means is proven for the intended purpose with positive results; or		
		(c) any other means acceptable to the competent authority; and		
		4.1.5 have a policy that defines how the remote pilot and ~~all~~any other personnel in charge of duties essential to the UAS operation can declare themselves fit to operate before conducting any operation.		
		4.1.6 ~~a~~As part of the procedures that are contained in the OM (point 4.1.1 above), include the description of the following:		
		(a) The method and means of communication with the authority or entity responsible for the management of the airspace during the entire period of the reserved or restricted		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition~~Provision~~**	**Demonstration of integrity[37]**	**Demonstration of assurance[37]**
		airspace being active, as mandated by the authorisation. *Note: The communication method should be published in the NOTAM activating the reserved airspace to also allow coordination with manned aircraft.*		
		(b) The member(s) of personnel in charge of duties essential to the UAS operation, who are responsible for establishing that communication.		
UAS maintenance	Low	4.2 In addition to the responsibilities defined in point UAS.SPEC.050 and the provisions for UAS operators in previous points, the UAS operator should ensure that:		
		4.2.1 ~~T~~the UAS maintenance instructions that are defined by the UAS operator ~~should be~~are included in the OM and cover at least the UAS manufacturer's instructions and requirements when applicable~~.~~; and		
		4.~~3.~~2.2 ~~T~~the maintenance staff ~~should~~ follow the UAS maintenance instructions when performing maintenance.		
External services	Low	4.~~4~~3 The UAS operator should ensure that the level of performance for any externally provided service that is necessary for the safety of the flight is adequate for the intended operation. The UAS operator should declare that this		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition~~Provision~~**	**Demonstration of integrity[37]**	**Demonstration of assurance[37]**
		level of performance is adequately achieved.		
		4.~~5~~4 The UAS operator should define and allocate the roles and responsibilities between the UAS operator and the external service provider(s), if applicable.		
5. Conditions ~~Provisions~~ for the personnel in charge of duties essential to the UAS operation				
	~~As per Appendix A to AMC2 Article 11 *The personnel in charge of duties essential to the UAS operation*~~			
General	Low	5.1 The UAS operator should ensure that all personnel in charge of duties essential to the UAS operation are provided with competency-based theoretical and practical training specific to their duties, which consists of the applicable theoretical elements derived from AMC1 UAS.SPEC.050(1)(d) and practical elements from AMC2 UAS.SPEC.050(1)(d) and UAS.SPEC.050(1)(e).		
		5.2 The training programme should be documented and at least the training syllabus should be available.		
		5.3 Evidence of training should be presented for inspection at the request of the competent authority or its authorised representative.		
Remote pilot	Low	5.4 The remote pilot should have the authority to cancel or delay any or all flight operations under the following conditions:		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition~~Provision~~**	**Demonstration of integrity[37]**	**Demonstration of assurance[37]**
		5.4.1 the safety of persons is jeopardised; or		
		5.4.2 property on the ground is jeopardised; or		
		5.4.3 other airspace users are in jeopardy; or		
		5.4.4 there is a violation of the terms of the remote pilot's authorisation.		
		5.5 The remote pilot should:		
		5.5.1 ensure that the UA remains clear of clouds; and		
		5.5.2 perform unaided visual scanning of the airspace, as required, to avoid any potential collision hazard.		
Multi-crew cooperation (MCC)	Low	Where multi-crew cooperation (MCC) may be required, the UAS operator should:		
		5.6 designate a remote pilot responsible for each flight;		
		5.7 include procedures to ensure coordination between the remote crew members through robust and effective communication channels; those procedures should cover, as a minimum:		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition~~Provision~~**	**Demonstration of integrity[37]**	**Demonstration of assurance[37]**
		5.7.1 the assignment of tasks to the remote crew members; and		
		5.7.2 the establishment of step-by-step communication; and		
		5.8 ensure that the training of the remote crew covers MCC.		
Maintenance staff	Low	5.9 Any staff member that is authorised by the UAS operator to perform maintenance activities should have been adequately trained in the documented maintenance procedures.		
		5.10 Evidence of training should be presented for inspection at the request of the competent authority or its authorised representative.		
		5.11 The UAS operator may declare that the maintenance team has received training in the documented maintenance procedures. However, evidence of this training should be made available at the request of the competent authority or its authorised representative.		
Personnel in charge of duties essential to the UAS operation are fit to operate	Low	5.12 The UAS operator should have a policy that defines how the personnel in charge of duties essential to the UAS operation can declare themselves fit to operate before conducting any operation.		
		5.13 The personnel in charge of duties essential to the UAS operation should		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition~~Provision~~**	**Demonstration of integrity[37]**	**Demonstration of assurance[37]**
		declare that they are fit to operate before conducting any operation, based on the policy that is defined by the UAS operator.		
6. Technical conditions~~provisions~~				
General	Low	6.1 The UAS should be equipped with means to monitor the critical parameters of a safe flight, in particular the following:		
		6.1.1 the UA position, height or altitude, ground speed or airspeed, attitude and trajectory;		
		6.1.2 the UAS energy status (fuel, battery charge, etc.); and		
		6.1.3 the status of critical functions and systems; as a minimum, for services based on RF signals (e.g. C2 Link, GNSS, etc.), means should be provided to monitor the adequate performance and trigger an alert if the level becomes too low.		
Human-machine interface (HMI)	Low	6.~~3~~2 The UAS information and control interfaces should be clearly and succinctly presented and should not confuse, cause unreasonable fatigue, or contribute to causing any disturbance to the personnel in charge of duties essential to the UAS operation in such a way that could adversely affect the safety of the operation.		
		6.~~4~~3 The UAS operator should conduct a UAS evaluation that considers and addresses human factors to determine whether		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition~~Provision~~**	**Demonstration of integrity[37]**	**Demonstration of assurance[37]**
		the HMI is appropriate for the operation.		
C2 links and communication	Low	6.~~5~~4 The UAS should comply with the applicable requirements for radio equipment and the use of the RF spectrum.		
		6.~~6~~5 Protection mechanisms against interference should be used, especially if unlicensed bands (e.g. ISM) are used for the C2 link (mechanisms such as FHSS, DSSS or OFDM technolog~~y~~ies, or frequency de-confliction by procedure).		
		6.~~7~~6 The UAS operator should ensure that reliable and continuous means of two-way communication for the purpose that is indicated in point 4.1.6(a) above are available.		
Tactical mitigation		~~N/A~~n/a		
Containment	Medium	6.~~8~~7 To ensure a safe recovery from a technical issue that involves the UAS or an external system supporting the operation, the UAS operator should ensure that:		
		6.~~8~~7.1 no probable failure of the UAS or of any external system supporting the operation should lead to operation outside the operational volume; and		
		6.~~8~~7.2 it is reasonably expected that a fatality will not occur due to any probable failure of the UAS or of		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition~~Provision~~**	**Demonstration of integrity[37]**	**Demonstration of assurance[37]**
		any external system supporting the operation. *Note: The term 'probable' should be understood in its qualitative interpretation, i.e. 'anticipated to occur one or more times during the entire system/operational life of an item'.*		
		6.~~9~~8 A design and installation appraisal should be made available and should cover at least:		
		6.~~9~~8.1 the design and installation features (independence, separation, and redundancy); and		
		6.~~9~~8.2 the particular risks (e.g. hail, ice, snow, electromagnetic interference, etc.) relevant to the ~~ConOps~~ type of operation.		
		6.~~10~~9 The following additional conditions ~~provisions~~ should apply if the adjacent area includes an assembly of people or if the adjacent airspace is classified as ARC-d (in accordance with AMC1 Article 11 ~~of~~to the UAS Regulation):		
		6.~~10~~9.1 The UAS should be designed to standards that are considered adequate by the competent authority and/or in accordance with a means of compliance that is acceptable to that competent authority such that:		
		6.~~10~~9.1.1. the probability of the UA leaving the operational volume should be less than 10^{-4}~~$^{-4}$~~/FH; and		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition~~Provision~~**	**Demonstration of integrity[37]**	**Demonstration of assurance[37]**
		6.~~10~~9.1.2 no single failure of the UAS or of any external system supporting the operation should lead to operation outside the ground risk buffer. *Note: The term 'failure' should be understood as an occurrence that affects the operation of a component, part, or element in such a way that it can no longer function as intended. Errors may cause failures but are not considered to be failures. Some structural or mechanical failures may be excluded from this criterion if it can be shown that these mechanical parts were designed according to aviation industry best practices.*		
		6.~~10~~9.2 SW and AEH whose development error(s) could directly lead to operations outside the ground risk buffer should be developed according to an industry standard or methodology that is~~are~~ recognised as adequate by the competent authority. *Note 1: The proposed additional safety conditions~~provisions~~ cover both the integrity and the assurance levels.* *Note 2: The proposed additional safety conditions~~provisions~~ do not imply a systematic need to develop the SW and AEH according to an industry standard or methodology that is~~are~~ recognised as adequate by the competent authority. For instance, if the UA		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition~~Provision~~**	**Demonstration of integrity[37]**	**Demonstration of assurance[37]**
		design includes an independent engine shutdown function that systematically prevents the UA from exiting the ground risk buffer due to single failures or a SW/AEH error of the flight controls from occurring, the intent of the conditions~~provisions~~ of point 6.14.1 above could be considered to be met.		
		6.1~~1~~0 Compliance with the conditions ~~provisions~~ of points 6.~~10~~9.1 and 6.~~10~~9.2 above should be substantiated by analysis and/or test data with supporting evidence.		
Remote identification	Low	6.11 According to Article 40(4) of Regulation (EU) 2019/945, the UAS 'shall have a unique serial number compliant with standard ANSI/CTA-2063-A-2019, *Small Unmanned Aerial Systems Serial Numbers*, 2019'.		
		6.12 According to Article 40(5) of Regulation (EU) 2019/945, the UAS 'shall be equipped with a remote identification system'.		

AMC4 Article 11 Rules for conducting an operational risk assessment

PREDEFINED RISK ASSESSMENT PDRA-S01 Version 1.0

EDITION ~~December 2020~~Month 2021

(a) Scope

This PDRA addresses the same type of operations that are covered by the standard scenario STS-01 (Appendix 1 to the Annex to the UAS Regulation); however, it provides the UAS operator with the flexibility to use UASs that do not need to be marked as Class C5.

This PDRA addresses UAS operations that are conducted:

(1) with UA with maximum characteristic dimensions (e.g. wingspan, rotor diameter/area or maximum distance between rotors in case of multirotor) of up to 3 m and MTOM of up to 25 kg;

(2) in VLOS of the remote pilot;

(3) over a controlled ground area that might be located in a populated area;

(4) below 150 m~~not higher than 120 m~~ above ~~the surface overflown~~ground level (AGL) (except when close to obstacles); and

(5) in controlled or uncontrolled airspace, provided that there is a low probability of encountering manned aircraft.

(b) PDRA characterisation and conditions~~provisions~~

The characterisation and conditions~~provisions~~ for this PDRA are summarised in **Table PDRA-S01.1** below:

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [38]**	**Demonstration of assurance[38]**
1. Operational characterisation (scope and limitations)				
Level of human intervention	Low	1.1 No autonomous operations: the remote pilot should have the ability to maintain control of the UA, except in case of a loss of the command and control (C2) link.		
		1.2 The remote pilot should operate only one UA at a time.		
		1.3 The remote pilot should not operate from a moving vehicle.		
		1.4 The remote pilot should not hand ~~over~~ the control of the UA over to another command unit.		
UA range limit	Low	1.5 VLOS distance from the remote pilot at all times.		
Areas overflown	Low	1.6 UAS operations should be conducted over a controlled ground area.		
		1.7 For the operation of a tethered UA, the area should have a radius equal to the tether length plus 5 m and should be centred on the point of the surface of the Earth where the tether is fixed.		
UA limitations	Low	1.8 The UA should have an MTOM of less than 25 kg, including payload.		
		1.9 The UA should have a maximum characteristic dimension (e.g. wingspan, rotor diameter/area or maximum distance between rotors in case of multirotor) of less than 3 m.		

[38] To be filled in by the UAS operator.

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [38]**	**Demonstration of assurance[38]**
Flight height limit	Low	1.10 The remote pilot should maintain the UA within 120 m from the closest point of the surface of the Earth. The measurement of the distances should be adapted according to the geographical characteristics of the terrain, such as plains, hills, and mountains.		
		1.11 When flying a UA within a horizontal distance of 50 m from an artificial obstacle that is taller than 105 m, the maximum height of the UAS operation may be increased up to 15 m above the height of the obstacle, at the request of the entity responsible for the obstacle.		
		1.12 The UAS operator may propose to operate at a height above 120 m, but up to 150 m. In that case, the UAS operator **should** define a risk buffer according to point 3.8 below.~~maximum height of the operational volume should not exceed by 30 m the maximum height that is allowed by points 1.10 and 1.11 above.~~		
	Low	1.13 The UA should be operated:		
		1.13.1 in uncontrolled airspace (Class F or G), unless different limitations are provided for by the Member States for their UAS geographical zones in areas where the probability of encountering manned aircraft is not low; or		
		1.13.2 in controlled airspace after coordination and flight		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [38]**	**Demonstration of assurance[38]**
		authorisation in accordance with the published procedures for the area of operation, to ensure a low probability of encountering manned aircraft. *Note: ~~An a~~Airspace with an air risk that is classified as not higher than ARC-b can be considered having a low probability of encountering manned aircraft.*		
Visibility	Low	1.14 The flight visibility should allow the remote pilot to conduct the entire flight in VLOS.		
Others	Low	1.15 The UA should not be used to carry dangerous goods, except for dropping items in connection with agricultural, horticultural or forestry activities ~~in which~~where the carriage of the items does not contravene any other applicable regulations.		
2. Operational risk classification (according to the classification defined in AMC1 Article 11 of the UAS Regulation)				
Final GRC	3	**Final ARC**	ARC-b	**SAIL** II
3. Operational mitigations				
Operational volume (see Figure 2 of AMC1 Article 11)	Low	3.1 The UAS operator should define the operational volume for the intended operation, including:		
		3.1.1 the flight geography; and		
		3.1.2 the contingency volume, with its external limit(s) at least 10 m beyond the limit(s) of the flight geography if the operation is conducted with untethered UA.		
		3.2 To determine the operational volume, the UAS operator should consider the		

<table>
<tr><th colspan="5">PDRA characterisation and conditions~~provisions~~</th></tr>
<tr><th>Topic</th><th>Assurance level</th><th>Condition</th><th>Demonstration of integrity [38]</th><th>Demonstration of assurance[38]</th></tr>
<tr><td></td><td></td><td>position-keeping capabilities of the UAS in 4D space (latitude, longitude, height, and time).</td><td></td><td></td></tr>
<tr><td></td><td></td><td>3.3 In particular, the accuracy of the navigation solution, the flight technical error of the UAS, as well as the flight path definition error (e.g. map error) and latencies should be considered and addressed when determining the operational volume.</td><td></td><td></td></tr>
<tr><td></td><td></td><td>3.4 The remote pilot should apply emergency procedures as soon as there is an indication that the UA may exceed the limits of the operational volume, as per point 5.1.4(d) below.</td><td></td><td></td></tr>
<tr><td>Ground risk</td><td>Low</td><td>3.5 The UAS operator should establish a ground risk buffer to protect third parties on the ground outside the operational volume.</td><td></td><td></td></tr>
<tr><td></td><td></td><td>3.6 For the operation of untethered UA, the ground risk buffer should cover a distance beyond the external limit(s) of the contingency area. That distance should be at least as defined below:
<table>
<tr><th rowspan="2">~~Maximum height above ground~~</th><th colspan="2">~~Minimum distance to be covered by the ground risk buffer for untethered UA~~</th></tr>
<tr><th>~~with an MTOM of up to 10 kg~~</th><th>~~with an MTOM of more than 10 kg~~</th></tr>
<tr><td>~~30 m~~</td><td>~~10 m~~</td><td>~~20 m~~</td></tr>
<tr><td>~~60 m~~</td><td>~~15 m~~</td><td>~~30 m~~</td></tr>
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<tr><td></td><td></td><td>~~90 m~~ ~~20 m~~ ~~45 m~~
~~120 m~~ ~~25 m~~ ~~60 m~~

<table><tr><th>Max AGL</th><th colspan="2">Minimum distance for ground risk buffer</th></tr><tr><th></th><th>with MTOM of up to 10 kg</th><th>with MTOM of more than 10 kg</th></tr><tr><td>30 m</td><td>10 m</td><td>20 m</td></tr><tr><td>60 m</td><td>15 m</td><td>30 m</td></tr><tr><td>90 m</td><td>20 m</td><td>45 m</td></tr><tr><td>120 m</td><td>25 m</td><td>60 m</td></tr></table></td><td></td><td></td></tr>
<tr><td></td><td></td><td>3.7 For the operation of tethered UA, the ground risk buffer is considered in point 1.7 above.</td><td></td><td></td></tr>
<tr><td>Air risk</td><td rowspan="4">Low</td><td>3.8 If the UAS operator intends to operate above 120 m and~~,~~ up to 150 m:</td><td></td><td></td></tr>
<tr><td>3.8.1 ~~T~~the UAS operator should establish an air risk buffer to protect third parties in the air outside the operational volume; and~~.~~</td><td></td><td></td></tr>
<tr><td>3.8.2 if the air risk buffer is part of controlled airspace, the UAS operator should coordinate the operations with the ANSP.</td><td></td><td></td></tr>
<tr><td>3.~~8~~9 The operational volume should be outside any geographical zone corresponding to a flight restriction zone of a protected aerodrome or of any other type, as defined by the responsible authority, unless the UAS operator has been granted ~~an~~ appropriate permission.</td><td></td><td></td></tr>
</table>

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [38]**	**Demonstration of assurance[38]**
		3.~~9~~10 Prior to the flight, the UAS operator should assess the proximity of the planned operation to manned aircraft activity.		
Observers		Airspace observers (AOs): n/a~~N/A.~~ UA observers: refer to point 5.1.4(b) below.		
4. UAS operator and UAS operations conditions ~~provisions~~				
UAS operator and UAS operations	Medium	4.1 In addition to the responsibilities that are defined in point UAS.SPEC.050 of the Annex to the UAS Regulation and the conditions~~provisions~~ for UAS operators in previous points of this AMC, the UAS operator should:		
		4.1.1 develop an operations manual (OM) (for the template, refer to AMC1 UAS.SPEC.030(3)(e) and to the complementary information in GM1 UAS.SPEC.030(3)(e));		
		4.1.2 define the operational volume and ground risk buffer for the intended operation, as per points 3.1 to 3.6 above, and include them in the OM;		
		4.1.3 ensure the adequacy of the contingency and emergency procedures and prove ~~them~~it through any of the following:		
		(a) dedicated flight tests; or		
		(b) simulations, provided that the representativeness of the simulation means is proven for the intended purpose with positive results; or		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [38]**	**Demonstration of assurance[38]**
		(c) any other means acceptable to the competent authority; and		
		4.1.4 develop an emergency response plan (ERP) that is suitable for the intended operation ~~(see point 7 of GM1 UAS.SPEC.030(3)(e))~~ in accordance with the conditions for a 'medium' level of robustness, which are included in AMC3 UAS.SPEC.030(3)(e);		
		4.1.5 upload updated information into the geo-awareness function, if such system is installed on the UAS, when required by the UAS geographical zone for the intended location of the operation;		
		4.1.6 ensure that before starting the operation, the controlled ground area is in place, effective, and compliant with the minimum distance that is defined in points 3.1 and 3.5 above and, when required, ~~coordination~~ coordinate with the appropriate authorities ~~has been established~~;		
		4.1.7 ensure that before starting the operation, all persons that are present in the controlled ground area:		
		(a) have been informed of the risks of the operation;		
		(b) have been briefed on or trained in, as appropriate, the safety precautions and measures that		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [38]**	**Demonstration of assurance[38]**
		the UAS operator has established for their protection; and		
		(c) have explicitly agreed to participate in the operation; and		
		4.1.8 ensure that the UAS that is used in the intended operation complies with the technical conditions ~~provisions~~ of point 6 below.		
		4.2 A UAS operation under this PDRA should be conducted:		
		4.2.1 keeping the UA in VLOS of the remote pilot at all times;		
		4.2.2 in accordance with the OM that is referred to in point 4.1.1 above;		
		4.2.3 over a controlled ground area that comprises the area of the operational volume that is indicated in point 3.1 above and the ground risk buffer that is indicated in point 3.5 above, both projected on the surface of the Earth;		
		4.2.4 at a ground speed of less than 5 m/s in case of untethered UA;		
		4.2.5 by a remote pilot that complies with point 5.1 below; and		
		4.2.6 with a UA that complies with point 6 below.		
UAS maintenance	Low	4.3 In addition to the responsibilities defined in point UAS.SPEC.050 and the provisions for UAS operators in previous points, the UAS operator should ensure that:		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [38]**	**Demonstration of assurance[38]**
		4.3.1 ~~T~~the UAS maintenance instructions that are defined by the UAS operator ~~should be~~are included in the OM and cover at least the UAS manufacturer's instructions and requirements when applicable~~.~~; and		
		4.~~4~~3.2 ~~T~~the maintenance staff ~~should~~ follow the UAS maintenance instructions when performing maintenance.		
External services	Low	4.~~5~~4 The UAS operator should ensure that the level of performance for any externally provided service that is necessary for the safety of the flight is adequate for the intended operation. The UAS operator should declare that this level of performance is adequately achieved.		
		4.~~6~~5 The UAS operator should define and allocate the roles and responsibilities between the UAS operator and the external service provider(s), if applicable.		
5. Conditions ~~Provisions~~ for the personnel in charge of duties essential to the UAS operation				
	~~As per Appendix A to AMC2 Article 11 *The personnel in charge of duties essential to the UAS operation*~~			
Remote pilot	Low	5.1 In addition to complying with the requirements of point UAS.SPEC.060 of the Annex to the UAS Regulation and with the conditions~~provisions~~ for remote pilots in previous points of this AMC, a remote pilot who is engaged in operations under this PDRA should:		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [38]**	**Demonstration of assurance[38]**
		5.1.1 hold a certificate of ~~remote pilot~~remote pilot theoretical knowledge, in accordance with Attachment A to Chapter I of Appendix 1 to the Annex to the UAS Regulation, which is issued by the competent authority or by an entity that is designated by the competent authority of a Member State;		
		5.1.2 hold an accreditation of completion of a practical skill ~~practical skill~~ training course for this PDRA, in accordance with Attachment A to Chapter I of Appendix 1 to the Annex to the UAS Regulation, which is issued by:		
		(a) an entity that has declared compliance with the requirements of Appendix 3 to the Annex to the UAS Regulation and is recognised by the competent authority of a Member State; or		
		(b) a UAS operator that has declared to the competent authority of the Member State of registration compliance with this PDRA and with the requirements of Appendix 3 to the Annex to the UAS Regulation;		
		5.1.3 before starting the UAS operation, verify that the means to terminate		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [38]**	**Demonstration of assurance[38]**
		the flight of the UA as well as the remote identification system are operational; and		
		5.1.4 during the flight:		
		(a) keep the UA in VLOS and maintain ~~a~~ thorough visual scan of the airspace that surrounds ~~is surrounding~~ the UA to avoid any risk of collision with manned aircraft; the remote pilot should discontinue the flight if the operation poses a risk to other aircraft, people, animals, environment or property;		
		(b) for the purpose of point (a) above, be possibly assisted by a UA observer; clear and effective communication should be established between the remote pilot and the UA observer;		
		(c) use the contingency procedures that are defined by the UAS operator for abnormal situations, including situations where the remote pilot has an indication that the UA may exceed the limits of the flight geography; and		
		(d) use the emergency procedures that are defined by the UAS		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [38]**	**Demonstration of assurance[38]**
		operator for emergencies, including triggering the means to terminate the flight when the remote pilot has an indication that the UA may exceed the limits of the operational volume; the means to terminate the flight should be triggered at least 10 m before the UA reaches the limits of the operational volume.		
		5.1.5 If operations are conducted at a height between 120 m and 150 m, the remote pilot should undergo additional theoretical knowledge training in the following topics:		
		(a) raising awareness about the air risk and about the existence of other airspace users;		
		(b) checking height determination/limitation devices; and		
		(c) using applicable procedures in case a manned aircraft is detected.		
6. Technical conditions~~provisions~~				
UAS	Low[39]	6.1 A UAS that is to be used in operations under this PDRA should comply with the		

[39] The containment requirements (reference to point 5 of Part 16 of Regulation (EU) 2019/945), should be demonstrated with a medium assurance level.

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [38]**	**Demonstration of assurance[38]**
		requirements of Part 16 of the Annex to Regulation (EU) 2019/945[40], except that the UAS does not need to:		
		6.1.1 bear a Class C3 UAS or Class C5 UAS identification ~~on itself~~;		
		6.1.2 be exclusively powered by electricity, if the UAS operator ensures that the environmental impact that is caused by the use of non-electric UAS is minimised;		
		6.1.3 include a notice that is published by EASA and provides the applicable limitations and obligations, as required by the UAS Regulation; and		
		6.1.4 include the manufacturer's instructions for the UAS if it is privately built; however, information on its operation and maintenance, as well as on the training of the remote pilot, should be included in the OM. ***Note 1:*** *The UAS can comply with point (9) of Part 4 of the Annex to Regulation (EU) 2019/945 by using an add-on that complies with Part 6 of the Annex to that~~said~~ Regulation.*		

[40] Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems (OJ L 152, 11.6.2019, p. 1) (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R0945).

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [38]**	**Demonstration of assurance[38]**
		Note 2: *If the UA does not ~~have~~ bear a physical serial number that is compliant with standard ANSI/CTA-2063-A 'Small Unmanned Aerial Systems Serial Numbers' and/or does not have an integrated system of direct remote identification, it can comply with point (9) of Part 4 of the Annex to Regulation (EU) 2019/945 by using an add-on that complies with Part 6 of the Annex to that~~said~~ Regulation.* ***Note 3****: If the UAS is privately built, there may be no identification on the UA of its MTOM. In that case, the operator should ensure that the MTOM of the UA, in the configuration of the UA before take-off, does not exceed 25 kg.*		

Table PDRA-S01.1 — Main limitations and conditions~~provisions~~ for PDRA-S01

AMC5 Article 11 Rules for conducting an operational risk assessment

PREDEFINED RISK ASSESSMENT PDRA-S02 Version 1.~~0~~1

EDITION ~~December 2020~~Month 2021

(a) Scope

This PDRA addresses the same type of operations that are covered by the standard scenario STS-02 (Appendix 1 to the Annex to the UAS Regulation); however, it provides the UAS operator with the flexibility to use UASs that do not need to be marked as Class C6.

This PDRA addresses UAS operations that are conducted:

(1) with UA with maximum characteristic dimensions (e.g. wingspan, rotor diameter/area or maximum distance between rotors in case of multirotor) of up to 3 m and MTOM of up to 25 kg;

(2) at a distance of up to 2 km from the remote pilot if airspace observers (AOs) are employed; otherwise at a distance of up to 1 km;

(3) over a controlled ground area that is entirely located in a sparsely populated area;

(4) below 150 m~~not higher than 120 m~~ above ground level (AGL)~~the surface overflown~~ (except when close to obstacles); and

(5) in controlled or uncontrolled airspace, provided that there is a low probability of encountering manned aircraft.

(b) PDRA characterisation and conditions~~provisions~~

The characterisation and conditions~~provisions~~ for this PDRA are summarised in **Table PDRA-S02.1** below:

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [41]**	**Demonstration of assurance[41]**
1. Operational characterisation (scope and limitations)				
Level of human intervention	Low	1.1 No autonomous operations: the remote pilot should have the ability to maintain control of the UA, except in case of a loss of the command and control (C2) link.		
		1.2 The remote pilot should operate only one UA at a time.		
		1.3 The remote pilot should not operate from a moving vehicle.		
		1.4 The remote pilot should not hand ~~over~~ the control of the UA over to another command unit.		
UA range limit	Low	1.5 UAS operations should be conducted:		
		1.5.1 keeping the UA in sight of the remote pilot during the launch and recovery of the UA, unless the recovery of the UA is the result of an emergency flight termination;		
		1.5.2 if no airspace observer (AO) is employed in the operation, with the UA no further than 1 km from the remote pilot; and		
		1.5.3 if one or more AOs are employed in the operation, with the UA no further than 2 km from the remote pilot.		
Areas overflown	Low	1.6 UAS operations should be conducted over a controlled ground area.		

[41] To be filled in by the UAS operator.

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [41]**	**Demonstration of assurance[41]**
UA limitations	Low	1.7 The UA should have an MTOM of less than 25 kg, including payload.		
		1.8 The UA should have a maximum characteristic dimension (e.g. wingspan, rotor diameter/area or maximum distance between rotors in case of multirotor) of less than 3 m.		
		1.9 The UA should have a maximum ground speed in level flight of not more than 50 m/s.		
Flight height limit	Low	1.10 The remote pilot should maintain the UA within 120 m from the closest point of the surface of the Earth. The measurement of the distances should be adapted according to the geographical characteristics of the terrain, such as plains, hills, and mountains.		
		1.11 When flying a UA within a horizontal distance of 50 m from an artificial obstacle that is taller than 105 m, the maximum height of the UAS operation may be increased up to 15 m above the height of the obstacle, at the request of the entity responsible for the obstacle.		
		1.12 The UAS operator may propose to operate at a height above 120 m, but up to 150 m. In that case, the UAS operator **should** define a risk buffer according to point 3.7 below.~~maximum height of the operational volume should not exceed by 30 m the maximum height that is allowed by points 1.10 and 1.11 above.~~		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [41]**	**Demonstration of assurance[41]**
	Low	1.13 The UA should be operated: 1.13.1 in uncontrolled airspace (Class F or G), unless different limitations are provided for by the Member States for their UAS geographical zones in areas where the probability of encountering manned aircraft is not low; or 1.13.2 in controlled airspace after coordination and flight authorisation in accordance with the published procedures for the area of operation, to ensure a low probability of encountering manned aircraft. *Note: ~~An a~~Airspace with an air risk that is classified as not higher than ARC-b can be considered having a low probability of encountering manned aircraft.*		
Visibility	Low	1.14 The UA operation should be conducted in an area where the flight visibility is more than 5 km.		
Others	Low	1.15 The UA should not be used to carry dangerous goods, except for dropping items in connection with agricultural, horticultural or forestry activities ~~in which~~where the carriage of the items does not contravene any other applicable regulations.		
2. Operational risk classification (according to the classification defined in AMC1 Article 11 of the UAS Regulation)				
Final GRC	3	**Final ARC**	ARC-b	**SAIL** II
3. Operational mitigations				

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [41]**	**Demonstration of assurance[41]**
Operational volume (see Figure 2 of AMC1 Article 11)	Low	3.1 The UAS operator should define the operational volume for the intended operation, including the flight geography and the contingency volume.		
		3.2 To determine the operational volume, the UAS operator should consider the position-keeping capabilities of the UAS in 4D space (latitude, longitude, height, and time).		
		3.3 In particular, the accuracy of the navigation solution, the flight technical error of the UAS, as well as the flight path definition error (e.g. map error) and latencies should be considered and addressed when determining the operational volume.		
		3.4 The remote pilot should apply emergency procedures as soon as there is an indication that the UA may exceed the limits of the operational volume, as per point 5.1.4(h) below.		
Ground risk	Low	3.5 The UAS operator should establish a ground risk buffer to protect third parties on the ground outside the operational volume.		
		3.6 The ground risk buffer should cover a distance that is at least equal to the distance specified by the UAS manufacturer's instructions, considering the operational conditions within the limitations specified by the UAS manufacturer.		
Air risk	Low	3.7 The operational volume should be outside any geographical zone corresponding to a		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [41]**	**Demonstration of assurance[41]**
		flight restriction zone of a protected aerodrome or of any other type, as defined by the responsible authority, unless the UAS operator has been granted ~~an~~ appropriate permission.		
		3.8 Prior to the flight, the UAS operator should assess the proximity of the planned operation to manned aircraft activity.		
Observers	Low	3.9 If the UAS operator decides to employ one or more airspace observers (AOs), the UA may be operated at a distance from the remote pilot greater than that referred to in point 1.5.2 above.		
		3.10 In relation to AOs, the UAS operator should comply with the conditions ~~provisions~~ of point 4.1.8 below.		
		3.11 AOs should comply with the conditions ~~provisions~~ of point 5.2 below.		
4. UAS operator and UAS operations conditions~~provisions~~				
UAS operator and UAS operations	Medium	4.1 In addition to the responsibilities that are defined in point UAS.SPEC.050 of the Annex to the UAS Regulation and the conditions~~provisions~~ for UAS operators in previous points of this AMC, the UAS operator should:		
		4.1.1 develop an operations manual (OM) (for the template, refer to AMC1 UAS.SPEC.030(3)(e) and to the complementary information in GM1 UAS.SPEC.030(3)(e));		
		4.1.2 define the operational volume and ground risk buffer for the intended		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [41]**	**Demonstration of assurance[41]**
		operation, as per points 3.1 to 3.6 above, and include them in the OM;		
		4.1.3 ensure the adequacy of the contingency and emergency procedures and prove ~~them~~it through any of the following:		
		(a) dedicated flight tests; or		
		(b) simulations, provided that the representativeness of the simulation means is proven for the intended purpose with positive results; or		
		(c) any other means acceptable to the competent authority; and		
		4.1.4 develop an emergency response plan (ERP) that is suitable for the intended operation ~~(see point 7 of GM1 UAS.SPEC.030(3)(e))~~ in accordance with the conditions for a 'medium' level of robustness, which are included in AMC3 UAS.SPEC.030(3)(e);		
		4.1.5 upload updated information into the geo-awareness function, if such system is installed on the UAS, when required by the UAS geographical zone for the intended location of the operation;		
		4.1.6 ensure that before starting the operation, the controlled ground area is in place, effective, and compliant with the minimum		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [41]**	**Demonstration of assurance[41]**
		distance that is defined in points 3.1 and 3.6 above and, when required, coordinate~~ion~~ with the appropriate authorities ~~has been established~~;		
		4.1.7 ensure that before starting the operation, all persons that are present in the controlled ground area:		
		(a) have been informed of the risks of the operation;		
		(b) have been briefed on or trained in, as appropriate, the safety precautions and measures that the UAS operator has established for their protection; and		
		(c) have explicitly agreed to participate in the operation; and		
		4.1.8 before starting the operation, and if airspace observers (AOs) are employed:		
		(a) ensure the correct placement and number of AOs along the intended flight path;		
		(b) verify that:		
		(i) visibility and the planned distance of the AO are within acceptable limits as defined in the OM;		
		(ii) there are no potential terrain obstructions for each AO;		
		(iii) there are no gaps between the zones that are covered by each of the AOs;		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [41]**	**Demonstration of assurance[41]**
		(iv) the communication with each AO is established and effective; and		
		(v) if means are used by the AOs to determine the position of the UA, those means are functioning and effective; and		
		(c) ensure that the AOs have been briefed on the planned flight path of the UA and on the associated timing; and		
		4.1.9 ensure that the UAS that is used in the intended operation complies with the technical conditions ~~provisions~~ of point 6 below.		
		4.2 A UAS operation under this PDRA should be conducted:		
		4.2.1 keeping the UA in sight of the remote pilot during the launch and recovery of the UA, unless the recovery of the UA is the result of an emergency flight termination;		
		4.2.2 in accordance with the OM that is referred to in point 4.1.1 above;		
		4.2.3 over a controlled ground area that comprises the area of the operational volume that is indicated in point 3.1 above and the ground risk buffer that is indicated in point 3.5 above, both projected on the surface of the Earth;		
		4.2.4 by a remote pilot that complies with point 5.1 below; and		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [41]**	**Demonstration of assurance[41]**
		4.2.5 with a UA that complies with point 6 below and is operated with:		
		(a) an active system to prevent the UA from exceeding the limits of the flight geography; and		
		(b) an active and updated system of direct remote identification.		
		4.3 If no AO is employed in the operation, the operation should be conducted with the UA flying no further from the remote pilot than the distance that is indicated in point 1.2.2 above and following a preprogrammed trajectory when the UA is not in VLOS of the remote pilot.		
		4.4 If one or more AOs are employed in the operation, the following conditions should be complied with:		
		4.4.1 the AO(s) should be positioned so as to adequately cover the operational volume and the surrounding airspace, having the minimum flight visibility that is indicated in point 1.10 above;		
		4.4.2 the UA should be operated no further than 1 km from the AO who is nearest to the UA;		
		4.4.3 the distance between any AO and the remote pilot should not be more than 1 km; and		
		4.4.4 robust and effective means are available for communication between the remote pilot and the AO(s).		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [41]**	**Demonstration of assurance[41]**
UAS maintenance	Low	4.5 In addition to the responsibilities defined in point UAS.SPEC.050 and the conditions for UAS operators in previous points, the UAS operator should ensure that:		
		4.5.1 ~~T~~the UAS maintenance instructions that are defined by the UAS operator ~~should be~~are included in the OM and cover at least the UAS manufacturer's instructions and requirements when applicable~~.~~; and		
		4.~~6~~5.2 ~~T~~the maintenance staff ~~should~~ follow the UAS maintenance instructions when performing maintenance.		
External services	Low	4.~~7~~6 The UAS operator should ensure that the level of performance for any externally provided service that is necessary for the safety of the flight is adequate for the intended operation. The UAS operator should declare that this level of performance is adequately achieved.		
		4.~~8~~7 The UAS operator should define and allocate the roles and responsibilities between the UAS operator and the external service provider(s), if applicable.		
5. Conditions ~~Provisions~~ for the personnel in charge of duties essential to the UAS operation				
	~~As per Appendix A to AMC2 Article 11 *The personnel in charge of duties essential to the UAS operation*~~			
Remote pilot	Low	5.1 In addition to complying with the requirements of point UAS.SPEC.060 of		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [41]**	**Demonstration of assurance[41]**
		the Annex to the UAS Regulation and with the conditions~~provisions~~ for remote pilots in previous points of this AMC, a remote pilot who is engaged in operations under this PDRA should:		
		5.1.1 hold a certificate of remote pilot ~~remote pilot~~ theoretical knowledge, in accordance with Attachment A to Chapter II of Appendix 1 to the Annex to the UAS Regulation, which is issued by the competent authority or by an entity that is designated by the competent authority of a Member State;		
		5.1.2 hold an accreditation of completion of a practical skill ~~practical skill~~ training course for this PDRA, in accordance with Attachment A to Chapter II of Appendix 1 to the Annex to the UAS Regulation, which is issued by:		
		(a) an entity that has declared compliance with the requirements of Appendix 3 to the Annex to the UAS Regulation and is recognised by the competent authority of a Member State; or		
		(b) a UAS operator that has declared to the competent authority of the Member State of registration compliance with this PDRA and		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [41]**	**Demonstration of assurance[41]**
		with the requirements of Appendix 3 to the Annex to the UAS Regulation;		
		5.1.3 before starting the UAS operation:		
		(a) set the programmable flight volume of the UA to keep it within the flight geography; and		
		(b) verify that the means to terminate the flight as well as the programmable flight volume functionality of the UA are operational; and		
		5.1.4 during the flight:		
		(a) unless supported by visual observers (VOs), maintain ~~a~~ thorough visual scan of the airspace that surrounds ~~is surrounding~~ the UA to avoid any risk of collision with manned aircraft; the remote pilot should discontinue the flight if the operation poses a risk to other aircraft, people, animals, environment or property;		
		(b) maintain control of the UA, except in case of a loss of the command and control link;		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [41]**	**Demonstration of assurance[41]**
		(c) operate only one UA at a time;		
		(d) not operate the UA from a moving vehicle;		
		(e) not hand ~~over~~ the control of the UA over to another control unit;		
		(f) inform the AO(s), when employed, in a timely manner of any deviations of the UA from the intended flight path, and of the associated timing;		
		(g) use the contingency procedures that are defined by the UAS operator for abnormal situations, including situations where the remote pilot has an indication that the UA may exceed the limits of the flight geography; and		
		(h) use the emergency procedures that are defined by the UAS operator for emergencies, including triggering the means to terminate the flight when the remote pilot has an indication that the UA may exceed the limits of the operational volume.		
		5.1.5 If operations are conducted at a height between 120 m and 150 m, have		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [41]**	**Demonstration of assurance[41]**
		additional theoretical knowledge training in the following topics:		
		(a) raising awareness about the air risk and about the existence of other airspace users;		
		(b) checking height determination/ limitation devices; and		
		(c) using procedures for coordination between the remote pilot and the AO(s);		
		(d) using applicable procedures in case a manned aircraft is detected.		
Airspace observer (AO)	Low	5.2 The AO's main responsibilities are laid down in point UAS.STS-02.050 of the Annex to the UAS Regulation.~~A.2 of Appendix A to AMC2 Article 11 *The personnel in charge of duties essential to the UAS operation.*~~		
		5.3 If operations are conducted at a height between 120 m and 150 m, the AO(s) should undergo additional theoretical knowledge training in the following topics:		

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [41]**	**Demonstration of assurance[41]**
		(a) raising awareness about the air risk and about the existence of other airspace users;		
		(b) checking height determination/ limitation devices;		
		(c) using procedures for coordination between the remote pilot and the AO(s); and		
		(d) using applicable procedures in case a manned aircraft is detected.		
6. Technical conditions~~provisions~~				
UAS	Low[42]	6.1 A UAS that is to be used in operations under this PDRA should comply with the requirements of Part 17 of the Annex to Regulation (EU) 2019/945[43], except that the UAS does not need to:		
		6.1.1 bear a Class C3 UAS or Class C6 UAS identification ~~on itself~~;		
		6.1.2 be exclusively powered by electricity, if the UAS operator ensures that the environmental impact that is caused by the use of non-electric UAS is minimised;		

[42] The containment requirements (reference to point 4 and 5 of Part 17 of Regulation (EU) 2019/945), should be demonstrated with a medium assurance level.

[43] Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems (OJ L 152, 11.6.2019, p. 1) (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R0945).

PDRA characterisation and conditions~~provisions~~				
Topic	**Assurance level**	**Condition**	**Demonstration of integrity [41]**	**Demonstration of assurance[41]**
		6.1.3 include a notice that is published by EASA and provides the applicable limitations and obligations, as required by the UAS Regulation; and		
		6.1.4 include the manufacturer's instructions for the UAS if it is privately built; however, information on its operation and maintenance, as well as on the training of the remote pilot, should be included in the OM. ***Note 1:*** *The UAS can comply with point (9) of Part 4 of the Annex to Regulation (EU) 2019/945 by using an add-on that complies with Part 6 of the Annex to that ~~said~~ Regulation.* ***Note 2:*** *If the UA does not bear ~~have~~ a physical serial number that is compliant with standard ANSI/CTA-2063-A 'Small Unmanned Aerial Systems Serial Numbers' and/or does not have an integrated system of direct remote identification, it can comply with point (9) of Part 4 of the Annex to Regulation (EU) 2019/945 by using an add-on that complies with Part 6 of the Annex to that ~~said~~ Regulation.* ***Note 3****: If the UAS is privately built, there may be no identification on the UA of its MTOM. In that case, the operator should ensure that the MTOM of the UA, in the configuration of the UA before take-off, does not exceed 25 kg.*		

Table PDRA-S02.1 — Main limitations and conditions~~provisions~~ for PDRA-S02

AMC1 Article 13 Cross-border operations or operations outside the State of registration

CROSS-BORDER OPERATIONS

(a) When a UAS operator intends to conduct an operation in a Member State (MS) other than the State of registration, it should firstly obtain an authorisation for that type of operation from the MS of registration.

(b) The UAS operator should:

(1) identify the applicable local conditions in the area of operation;

(2) adapt the operational procedures as necessary to comply with:

(i) the local conditions, and

(ii) the application to the new location(s) of the mitigation measures, identified in the operational authorisation;

(3) submit to the competent authority of the MS of operation (refer to https://www.easa.europa.eu/domains/civil-drones/naa to find the links to the NAA websites) an application for a cross-border operation using the form provided in AMC1 Article 13(1), attaching:

(i) a copy of the authorisation issued by the competent authority of the MS of registration, or a copy of the LUC terms of reference in case the operation is conducted within the privileges of the LUC granted by the competent authority of the MS of registration;

(ii) the chapter(s) of the operations manual (OM) providing the operational procedures and the relevant information amended to comply with the local conditions and the application of the mitigation measures to the new intended location(s); alternatively, the UAS operator can submit the full OM (this may be the case when the chapter(s) of the OM are connected to each other);.and

(iii) evidence that compliance has been shown with point (ii) according to the level of robustness of the mitigation measures.

(c) The competent authority of the MS of operation should, without undue delay, evaluate the information provided by the UAS operator and verify the application of local condition(s) and of the updated mitigation measures applicable to the intended location(s) of the operation.

(d) As soon as the competent authority of the MS of operation is satisfied, it should provide the competent authority of the MS of registration and the UAS operator with the confirmation of acceptability (refer to the template provided in AMC1 Article 13(2)) that the updated mitigation measures are satisfactory for the intended location(s).

(e) After receiving the confirmation of acceptability, the UAS operator may start its operation.

(f) The competent authority of the MS of registration should issue a revision of the operational authorisation listing the additional new location(s).

AMC1 Article 13(1) Cross-border operations or operations outside the State of registration

APPLICATION FORM FOR A CROSS-BORDER UAS OPERATION

Application for a cross-border UAS operation in the 'specific' category

Data protection: Personal data included in this application is processed by the competent authority pursuant to Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). Personal data will be processed for the purposes of the performance, management and follow-up of the application by the competent authority in accordance with Article 12 of Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft.

If the applicant requires further information concerning the processing of their personal data or exercising their rights (e.g. to access or rectify any inaccurate or incomplete data), they should refer to the contact point of their competent authority.

The applicant has the right to file a complaint regarding the processing of their personal data at any time to the national data protection supervisor authority.

☐ New application	☐ Amendment to confirmation of acceptability NNN-COB-xxxxx/yyy	
1. UAS operator and approval data		
1.1 UAS operator registration number		
1.2 UAS operator name		
1.3 Operational point of contact Name Telephone Email		
1.4 Type of approval	**1.4.1 Operational authorisation / LUC number issued by the MS of registration**	**1.4.2 Expiration date**
☐ Operational authorisation ☐ LUC		
2. Locations		
2.1 Intended location(s) for the operation		
2.2 Classification of the airspace where the operation is intended to be conducted	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G	
2.3 Expected date of start of the operation	**2.4 Expected end date**	
2.5. Applicable local conditions		
3. Update of the application of the mitigation means and local conditions		

3.1 Updated 'Location of UAS operation' chapter of the operations manual (OM), if applicable	
3.2 Compliance evidence for updated mitigation measures and local conditions	
4. Remarks	
5. Declaration of compliance	
I, the undersigned, hereby request the confirmation of acceptability of the cross-border UAS operation in xxx (name of the Member State) and declare that the UAS operation will comply with: *— any national rules related to privacy, data protection, liability, insurance, security, and environmental protection;* *— the applicable requirements of Regulation (EU) 2019/947; and* *the limitations and conditions defined in the operational authorisation provided by the competent authority of the Member State of registration and in the confirmation of acceptability of the cross-border UAS operation provided by the competent authority of the Member State of operation.* *Moreover, I declare that the related insurance coverage, if applicable, will be in place at the start date of the UAS operation.*	
Date	***Signature***

Instructions for filling in the application form

If the application relates to an amendment to a confirmation of acceptability for a cross-border UAS operation, please indicate the number of the confirmation of acceptability and fill out in red the fields that are amended compared to the last confirmation of acceptability.

1.1 The UAS operator registration number in accordance with Article 14 of the UAS Regulation.

1.2 Name of the UAS operator as declared during the registration process.

1.3 Contact data of the person responsible for the operation, in charge to answer possible operational questions raised by the competent authority.

1.4 Select one of the two options.

1.4.1 Number of the operational authorisation or of the LUC terms of approval issued by the MS of registration. The referenced document should be attached to the application.

1.4.2 Expiration date of the document listed in 1.4.2. If the validity is unlimited, indicate 'Unlimited'.

2.1 Location(s) in the MS of operation where the UAS operator intends to conduct the UAS operation. The location(s) should be expressed in the same way as in the operational authorisation (e.g. generic or specific, as defined by the geographical coordinates).

2.2 Select one of the seven options.

2.3 Date on which the UAS operator expects to start the operation.

2.4 Date on which the UAS operator expects to end the operation.
The UAS operator may ask for an unlimited duration; in this case, indicate 'Unlimited'.

2.5 List the local conditions applicable to the location(s) defined in point 2.1 (e.g. special frequency to be avoided, national insurance regulation, etc.).

3.1 Indicate either the identification and revision number of the OM or the document with an extract of the OM including the chapter describing the operational procedures and the relevant information, amended by the UAS operator, to comply with the local conditions and after the application of the mitigation measures in the intended location(s). This document should be attached to the application.

3.2 Indicate the compliance evidence file identification and revision number. This document should be attached to the application.

4 Free-text field for the addition of any relevant remark.

Note: In case of LUC, point 3 should not be filled in if according to the LUC terms of approval the organisation has the privilege to extend the operational authorisation to different locations.

AMC1 Article 13(2) Cross-border operations or operations outside the State of registration

FORM FOR THE CONFIRMATION OF ACCEPTABILITY OF A CROSS-BORDER UAS OPERATION IN THE 'SPECIFIC' CATEGORY

Confirmation of acceptability of a cross-border UAS operation in the 'specific' category		NAA Logo
1. UAS operator and approval data		
1.1 UAS operator registration number		
1.2 UAS operator name		
1.3 Operational point of contact **Name** **Telephone** **Email**		
1.4. Type of approval	**1.4.1. Operational authorisation / LUC number issued by MS of registration**	**1.4.2 Expiration date**
☐ Operational authorisation ☐ LUC		
2. Locations		
Location(s) for the operation		
3. Remarks		
4. Confirmation of acceptability		

4.1 Confirmation number	
4.2 Expiration date	
4.3 Updated 'Location of UAS operation' chapter of the operations manual, if applicable	
4.4 Compliance evidence for updated mitigations and local conditions	
xxx (name of the competent authority) confirms that the updated mitigation measures and application of local conditions proposed by the applicant are satisfactory for the operation at the location(s) defined in point 3.1. This certificate is valid as long as the applicant complies with the operational authorisation or the LUC terms of approval defined in point 1.4.1 of the application, with Regulation (EU) 2019/947 and with any applicable Union and national regulations related to privacy, data protection, liability, insurance, security, and environmental protection.	
Date	***Signature and stamp***

Instructions for filling in the form for the 'Confirmation of acceptability of a cross-border UAS operation in the "specific" category'.

1.1 The UAS operator registration number in accordance with Article 14 of the UAS Regulation.

1.2 Name of the UAS operator as declared during the registration process.

1.3 Contact data of the person responsible for the operation, in charge to answer possible operational questions raised by the competent authority.

1.4 Select one of the two options.

1.4.1. Number of the operational authorisation or of the LUC terms of approval issued by the MS of registration.

1.4.2 Expiration date of the document listed in 1.4.2. If the validity is unlimited, indicate 'Unlimited'.

2. Location(s) in the MS of operation where the UAS operator is authorised to operate. The location(s) should be expressed in the same way as in the operational authorisation (e.g. generic or specific, as defined by the geographical coordinates).

3. Free-text field for the addition of any relevant remark.

4.1 Reference number of the confirmation of acceptability, as issued by the competent authority. The number should have the following format:

NNN-CBO-xxxxx/yyy

Where:

— 'NNN' is the ISO 3166 Alpha-3 code of the MS that issues the confirmation of acceptability of the operational authorisation number;

— 'CBO' is a fixed field meaning 'cross-border operation';

— 'xxxxx' are 5 alphanumeric characters defining the confirmation of acceptability of the operational authorisation number; and

— 'yyy' are 3 alphanumeric characters defining the revision number of the confirmation of acceptability of the operational authorisation number. Each amendment of the confirmation of acceptability of the operational authorisation number will determine a new revision number.

4.2 The duration of the confirmation of acceptability of the operational authorisation may be unlimited; in this case, indicate 'Unlimited'. The confirmation of acceptability will be valid as long as the UAS operator

complies with the relevant requirements of the UAS Regulation and with the conditions defined in the operational authorisation and in the confirmation of acceptability.

4.3 If the UAS operator provides the revised operations manual (OM), indicate its identification and revision number, otherwise the identification and revision number of the chapter with the updated locations, if only this is provided to the competent authority.

4.4 Indicate the compliance evidence file identification and revision number.

Note 1: In case of LUC, point 2 should not be filled in if according to the LUC terms of approval the organisation has the privilege to extend the operational authorisation to different locations.

Note 2: The signature and stamp may be provided in electronic form. The QR code should provide the link to the national database where the confirmation of acceptability for cross-border operations is stored.

AMC1 Article 15(1) Operational conditions for UAS geographical zones

CROSS-BORDER UAS GEOGRAPHICAL ZONE(S)

When more than one EASA Member State decide to designate a cross-border UAS geographical zone(s), those Member States should establish coordination procedures in accordance with Article 19(1) of the UAS Regulation. Those coordination procedures should indicate which country codes should be used for the identification of the zone(s).

GM1 Article 15(1) Operational conditions for UAS geographical zones

GENERAL ASPECTS

In line with the Chicago Convention[44], UAS geographical zones with restrictions and prohibitions should not be designated over the high seas.

UAS geographical zones are defined in accordance with policies and procedures that are established by the EASA Member States. Various entities (e.g. public institutions, law enforcement authorities, ANSPs, local authorities, nature park authorities, the military, etc.) may initiate the definition of UAS geographical zones. The initiating entity may provide the approving entity with the data on the UAS geographical zone(s) together with supporting material in accordance with the EASA Member States' arrangements for validation and confirmation or approval, as necessary.

Formal arrangements between the initiating entity and the entity that processes the data for the definition of the UAS geographical zone may be considered. Such formal arrangements may include specific requirements on data quality.

If a flight authorisation is required to enter a UAS geographical zone, the EASA Member States also establish the related procedure and designate the entity responsible for providing such authorisation.

[44] ICAO Doc 7300 — Convention on International Civil Aviation.

GM2 Article 15(1) Operational conditions for UAS geographical zones

DATA QUALITY

When establishing UAS geographical zones, the EASA Member States may require specific data quality requirements based on the purpose and location of a given zone.

Example 1

If a UAS geographical zone is fully or partially situated in controlled airspace, it should, as far as practicable, comply with the data quality requirements applicable to prohibited/restricted/danger areas included in Annex III (Part-ATM/ANS.OR) to Commission Implementing Regulation (EU) 2017/373[45] Appendix 1 'Aeronautical data catalogue'.

Example 2

If a UAS geographical zone is situated in uncontrolled airspace and, for example, over terrain that contains one of the infrastructures or areas/zones listed below, the data quality requirements, as considered relevant and practicable by the EASA Member States, may apply to data and zones related to features that are not addressed in Annex III (Part-ATM/ANS.OR) to Commission Implementing Regulation (EU) 2017/373 Part ATM/ANS.OR Appendix 1 'Aeronautical data catalogue':

— highways, express ways and roads,

— railroads,

— hospitals,

— artworks,

— rural and urban areas,

— local restrictions to reduce noise, climate and nature impact,

— nature parks,

— reserved areas,

— populated areas,

— bridges,

— critical sites,

— secure areas,

— electrical power lines,

— zones forbidden for aerial photography,

— harbour areas,

[45] Commission Implementing Regulation (EU) 2017/373 of 1 March 2017 laying down common requirements for providers of air traffic management/air navigation services and other air traffic management network functions and their oversight, repealing Regulation (EC) No 482/2008, Implementing Regulations (EU) No 1034/2011, (EU) No 1035/2011 and (EU) 2016/1377 and amending Regulation (EU) No 677/2011 (OJ L 62, 8.3.2017, p. 1) (https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32017R0373&qid=1625476297788).

— industrial areas,

— emergency drone zones (e.g. areas for stacking or emergency landings in the event of traffic conflicts or equipment failure).

GM3 Article 15(1) Operational conditions for UAS geographical zones

DATA INTEGRITY

When a UAS geographical zone is established, the corresponding data is encoded in the common unique digital format (see AMC1 Article 15(3)).

When processed, for data related to the UAS geographical zones described in AMC3 to Article15(1) Example 2, as a minimum, data integrity is ensured as prescribed in Part-ATM/ANS.OR.A.085(b)(2) 'Aeronautical data quality management' and in Part-AIS.TR.200(c) 'General' of Commission Implementing Regulation (EU) 2017/373.

AMC1 Article 15(2) Operational conditions for UAS geographical zones

EXEMPTION(S) FROM ONE OR MORE OF THE 'OPEN' CATEGORY REQUIREMENTS

EASA Member States may designate UAS geographical zones in which UAS operations are allowed without the need for an application for an operational authorisation even if some of the 'open' category requirements are not complied with. In those UAS geographical zones, UAS operators must still comply with the remaining applicable requirements (i.e. with the other 'open' category requirements or the ones included in the declaration if the UAS operations are covered by a standard scenario or by an operational authorisation).

GM1 Article 15(2) Operational conditions for UAS geographical zones

EXEMPTION(S) FROM ONE OR MORE OF THE 'OPEN' CATEGORY REQUIREMENTS

Examples of operations that the EASA Member States may authorise in UAS geographical zones without an application for an operational authorisation are:

— operations in the 'open' category, conducted with UASs that exceed 25 kg (a different weight threshold may be defined by the EASA Member States);

— operations in the 'open' category, conducted at a height that exceeds 120 m (a different height threshold may be defined by the EASA Member States); and

— operations in all categories, conducted with UASs that are not equipped with some technical features, such as electronic identification or geo-awareness.

GM2 Article 15(2) Operational conditions for UAS geographical zones

MEANS TO INFORM MANNED AVIATION OF UAS GEOGRAPHICAL ZONES

In UAS geographical zones where UAS operations are exempted from one or more of the 'open' category requirements, the EASA Member States should ensure that manned aviation is informed of the possible presence of UASs that are exempted from the applicable operational limitations.

AMC1 Article 15(3) Operational conditions for UAS geographical zones

COMMON UNIQUE DIGITAL FORMAT

The 'common unique digital format' should be as described in Chapter 8 'UAS restriction zone data model' of the European Organization for Civil Aviation Equipment (EUROCAE) ED-269 'MINIMUM OPERATIONAL PERFORMANCE STANDARD FOR GEOFENCING', Edition June 2020.

AMC2 Article 15(3) Operational conditions for UAS geographical zones

PUBLICATION OF INFORMATION ON UAS GEOGRAPHICAL ZONES IN THE AERONAUTICAL INFORMATION PUBLICATION (AIP)

(a) The EASA Member States should publish in Section ENR 5.3.1 'Other activities of a dangerous nature' of the AIP the information on where and how the data on UAS geographical zones is publicly available in the common unique digital format.

(b) The EASA Member States should publish in Section ENR 5.1 'Prohibited, restricted and danger areas' of the AIP information on UAS geographical zones that affect manned aircraft operations.

(c) In addition to making UAS geographical zones publicly available in a common unique digital format, the EASA Member States, when publishing data in the AIP, should ensure consistency.

AMC3 Article 15(3) Operational conditions for UAS geographical zones

CROSS-BORDER UAS GEOGRAPHICAL ZONE(S)

All affected neighbouring EASA Member States should make data available for the part of the cross-border UAS geographical zone that is located in their own territory. The conditions for the coordination process should ensure consistency across all resulting data sets.

GM1 Article 15(3) Operational conditions for UAS geographical zones

PUBLICATION OF MAPS OF UAS GEOGRAPHICAL ZONES

When EASA Member States decide to publish maps that provide information on UAS geographical zones, in addition to making data in the common unique digital format available on their website or via smartphone applications, consistency with Chapter 8 of ED-269, Edition June 2020, should be ensured.

The EASA Member States should ensure consistency with the relevant aeronautical information publication (AIP) data in cases where a UAS geographical zone is at the same time established and published for the purpose of manned aviation. This, for instance, is the case for U-space airspace.

Examples of maps of UAS geographical zones with colour-code index

Note: The following examples, including colour codes and explanations, are courtesy of the 'Latvijas gaisa satiksme', the Latvian ANSP, for the purpose of illustration only and not to be used for UAS operations.

COLOR CODE	MEANING
	UAS geographical zones in which UAS operations are prohibited. However, such restrictions may be waived for certain users via a customised definition of the XX in the description of the UAS geographical zone. However, restrictions may be waived for particular users. UAS operations in some UAS geographical zones may be subject to the fulfilment of special requirements, e.g. compliance with published procedures, request for flight authorisation, etc. The competent authority should publish the conditions for obtaining the waiver and the contact point of the entity from which the flight authorisation needs to be requested.
	UAS geographical zones in which UAS operations are limited and subject to the fulfilment of a set of conditions that are imposed for such zones. For example, UAS operations are permitted in such UAS geographical zones if the UAS MTOM does not exceed 1.5 kg and the flight altitude is below 50 m above the ground.
	UAS geographical zones that facilitate UAS operations in the 'open' category (UAS operations are exempt from one or more of the 'open' category requirements).

	U-space airspace where UAS operations are supported by a set of U-space services. UAS operations are compliant with the capability and performance requirements that are determined for the particular U-space airspace. The EASA Member States should list the U-space service provider (USSP) that is identified for that geographical zone.
	Riga flight information region (FIR) boundary.

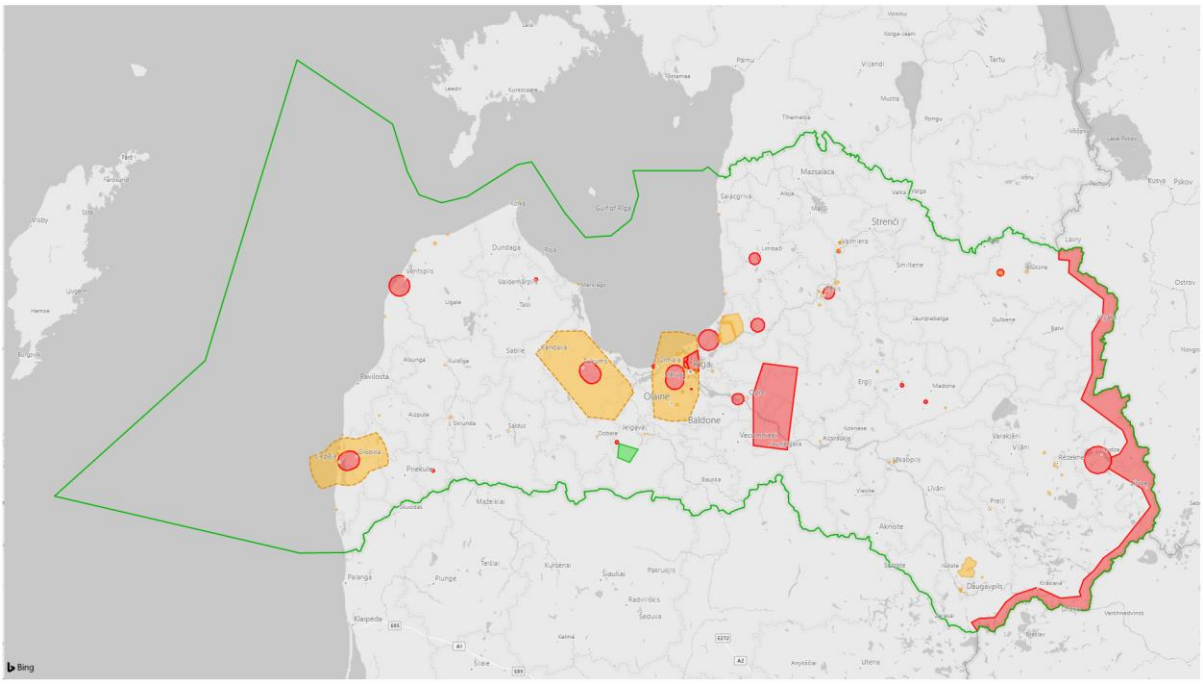


Figure 1 — Example of UAS geographical zones

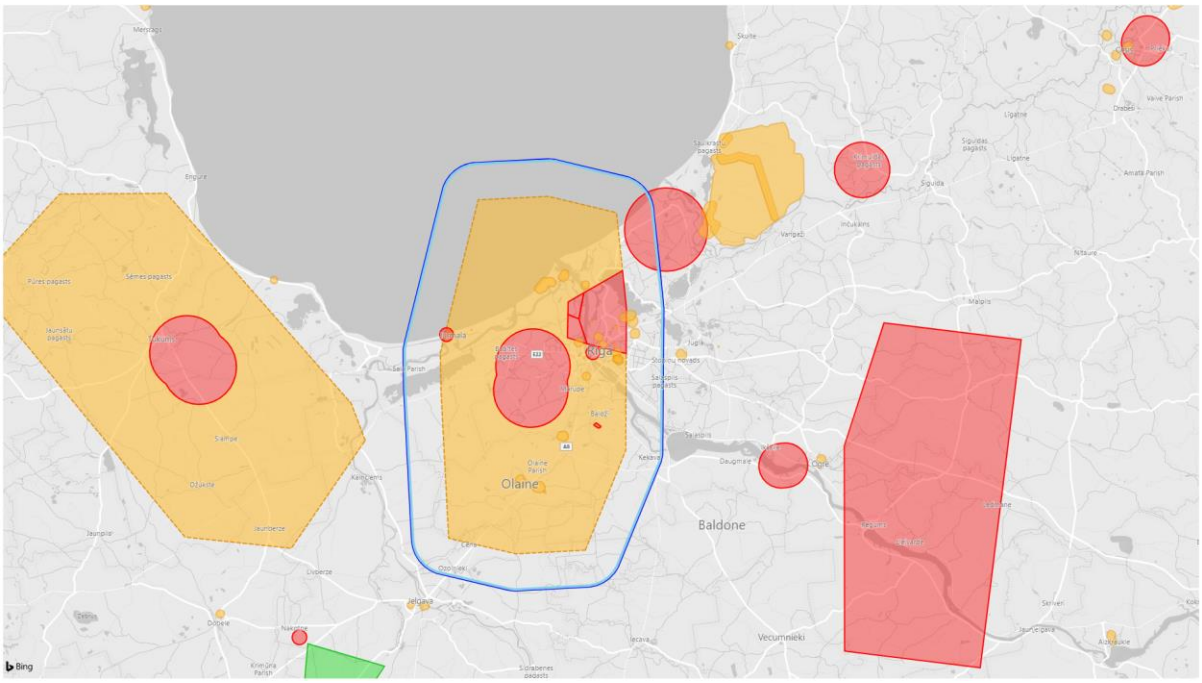


Figure 2 — Examples of UAS geographical including representation of planned U-space

GM2 Article 17 Designation of the competent authority

DESIGNATED VERSUS RECOGNISED ENTITIES

According to Article 17 of the UAS Regulation, EASA Member States may be supported in fulfilling their tasks that are referred to in Article 18 by two types of entities: 'designated entities' or 'recognised entities'.

1. Designated entities

A 'designated entity' should be understood as an entity that is designated by the competent authority within the meaning of a qualified entity as defined in Article 69 of Regulation (EU) 2018/1139 (the 'Basic Regulation')[46].

The term 'certification' should be understood as defined in Article 3(9) of the Basic Regulation. Certification refers to any recognition of compliance with the Basic Regulation or its delegated and implementing acts, including the verification of pilot competency.

The UAS Regulation allows competent authorities to appoint 'designated entities' to fulfil some of their tasks, as for example point UAS.OPEN.030(2) where the competent authority should be understood as the competent authority that is designated by the EASA Member State for the purposes of Article 17(1) of the UAS Regulation, and within the meaning of the 'national competent authority' as defined in Article 3(34) of the Basic Regulation.

[46] Regulation (EU) 2018/1139 of the European Parliament and of the Council of 4 July 2018 on common rules in the field of civil aviation and establishing a European Union Aviation Safety Agency, and amending Regulations (EC) No 2111/2005, (EC) No 1008/2008, (EU) No 996/2010, (EU) No 376/2014 and Directives 2014/30/EU and 2014/53/EU of the European Parliament and of the Council, and repealing Regulations (EC) No 552/2004 and (EC) No 216/2008 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91 (OJ L 212, 22.8.2018, p. 1).

Both the competent authority that is designated as per Article 17(1) of the UAS Regulation and the entity that is designated by the competent authority as per point UAS.OPEN.030(2) should issue a certificate of remote pilot competency, as provided for in AMC2 UAS.OPEN.030(2) 'UAS operations in subcategory A2' to allow for potential verification by the law enforcement authority.

2. Recognised entities

Recognised entities are not allowed to perform tasks on behalf of the EASA Member States. However, they may provide an independent verification of compliance of the applicant (e.g. the UAS operator or remote pilot) with certain requirements and may recommend the competent authority to issue a certificate.

An example of such an entity is provided in point UAS.STS-01.020(1)(e)(ii). In such a case, no formal accreditation process is required for the recognised entity and the competent authority may be satisfied with only a declaration of compliance with the requirements listed in Appendix 3 to the Annex to the UAS Regulation.

However, such act of recognition is not imposed by EU law; it may be imposed by national law. In this case, such act of recognition will be valid only within the Member State that has imposed it. EASA can oversee whether the competent authorities have recognised entities to perform some of their activities. However, as EU law does not require to assess the performance of such entities, any assessment may be foreseen by national law and ultimately be at the discretion of the competent authorities that decided to recognise a certain entity, e.g. for training.

SORA recommends that compliance with the operational safety objectives (OSOs) be verified by a third party for operations in the 'specific' category, which require a high level of robustness. In such case, the EASA Member States may appoint:

— designated entities if they are also delegated to issue the operational authorisation; or

— recognised entities if they may only verify compliance and recommend the competent authority to issue the operational authorisation.

AMC1 Article 18(e) Tasks of the competent authority

DOCUMENTS, RECORDS AND REPORTS TO BE KEPT

(a) The competent authority should keep at least the following documentation:

[…]

(5) Documentation related to audits and inspections regarding the oversight of the competent authority by EASA, as well as the oversight of UAS operators and other entities by the competent authority. This documentation should include at least the following:

(i) training, qualification, and authorisation of team leaders and team members of the competent authority;

(ii) inspection programmes;

(iii) reports;

(iv) findings and related evidence;

(v) agreed corrections and corrective actions; and

(vi) closure of findings of non-conformity and related evidence.

(b) The records should be kept for at least 3~~for three~~ years after their validity date expires.

GM1 Article 19(1) Safety information

CROSS-BORDER GEOGRAPHICAL ZONE(S)

The coordination among the EASA Member States includes the designation of cross-border geographical zones as per AMC1 Article 15(1).

GM1 Article 22(b) Transitional provisions

UAS OPERATIONS CLOSE TO PEOPLE

When operating a UAS with a maximum take-off mass (MTOM) of up to 2 kg, the remote pilot may fly the UAS at a distance of less than 50 m from involved persons.

3.1.2. Draft AMC and GM to Part-UAS (Annex to the UAS Regulation)

AMC1 UAS.OPEN.020(4)(b) and UAS.OPEN.040(3) UAS operations in subcategories A1 and A3

THEORETICAL KNOWLEDGE SUBJECTS FOR BASIC ONLINE THEORETICAL KNOWLEGDE TRAINING COURSES AND THEORETICAL KNOWLEGDE EXAMINATIONS FOR SUBCATEGORIES A1 AND A3

The acquisition of theoretical knowledge by the~~each~~ remote pilot should cover at least the following ~~elements~~theoretical knowledge subjects:

[…]

(e) Operational procedures:

(1) pre-flight:

(i) assessment of the area of operation and the surrounding area, including the terrain and potential obstacles and obstructions for keeping VLOS of the UA, potential overflight of uninvolved persons, and the potential overflight of critical infrastructure;

(ii) identification of a safe area where the remote pilot can perform a practice flight;

(iii) environmental and weather conditions (e.g. factors that can affect the performance of the UAS such as electromagnetic interference, wind, temperature, etc.); methods of obtaining weather forecasts; and

(iv) checking the conditions of the UAS;

(2) in-flight:

(i) normal procedures; and

(ii) contingency procedures for abnormal situations: ~~(e.g. for lost-data-link connections);~~

(a) managing the UAS flight path in abnormal situations;

(b) managing a situation when the UAS positioning equipment is impaired;

(c) managing a situation of incursion of a person into the area of operation, and taking appropriate measures to maintain safety;

(d) managing the exit from the operation zone as defined during the flight preparation;

(e) managing the incursion of a manned aircraft nearby the area of operation;

(f) managing the incursion of another UAS into the area of operation;

(g) dealing with a situation of a loss of attitude or position control generated by external phenomena; and

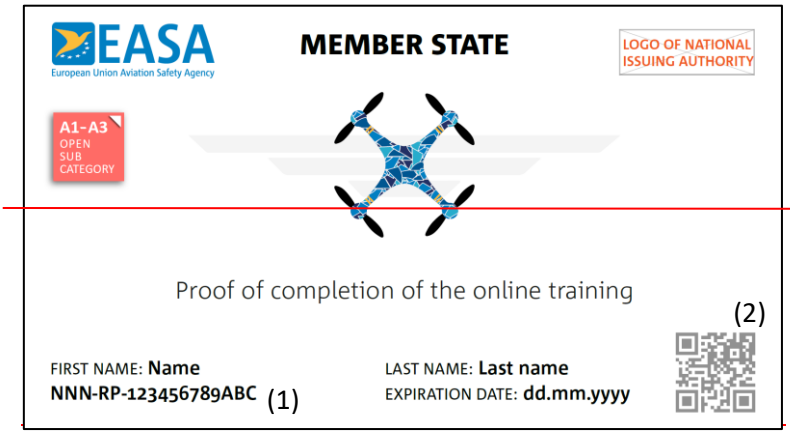
(h) conducting the loss-of-link procedure;

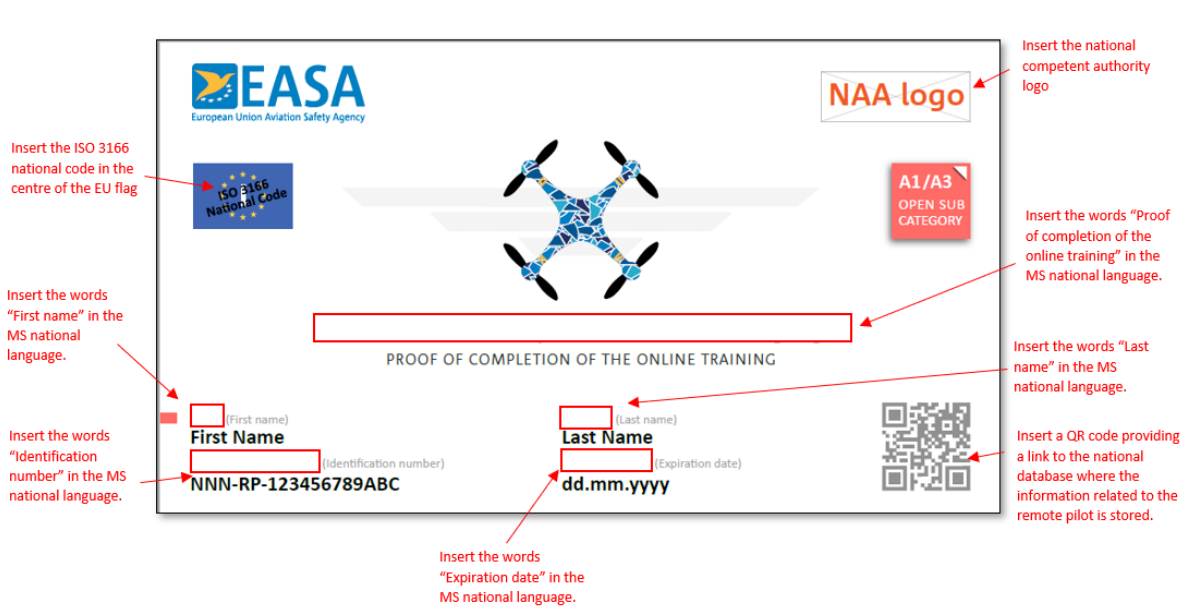
[…]

AMC2 UAS.OPEN.020(4)(b) and UAS.OPEN.040(3) UAS operations in subcategories A1 and A3

PROOF OF COMPLETION OF THE ONLINE THEORETICAL KNOWLEGDE TRAINING COURSE AND SUCCESSFUL COMPLETION OF THE ONLINE THEORETICAL KNOWLEGDE EXAMINATION

Upon receipt of the proof that ~~of~~ a remote pilot has successfully completed the online theoretical knowledge training course and ~~passing~~ the online theoretical knowledge examination, the ~~MS~~competent authority or the entity that is designated by the competent authority should provide a ~~the following~~ proof of completion to the remote pilot in the format that is depicted in the figure below. The proof may be provided in electronic form.





~~(1) Insert the identifier~~The identification number that is provided by the competent authority, or the entity that is designated by the competent authority ~~releasing~~ that issues the proof of completion~~. The reference~~ should have the following format:

NNN-RP-xxxxxxxxxxxx

Where:

— 'NNN' is the ISO 3166 Alpha-3 code of the MS ~~releasing~~that issues the proof of completion;

— 'RP' is a fixed field meaning~~:~~ 'remote pilot'; and

— ~~X~~'xxxxxxxxxxxx' are 12 alphanumeric characters (lower-case only) defined by the ~~MS~~ competent authority or the entity that is designated by the competent authority of an EASA Member State that issues ~~releasing~~ the proof of completion.

~~As an e~~Example: (FIN-RP-123456789abc)

~~(2) QR code providing a link to the national database where the information related to the remote pilot is stored.~~ Through the quick response (QR) code that links to the 'remote pilot ~~identifier',~~ number', ~~(1)~~ all information related to the training of the remote pilot can be retrieved~~.~~ by authorised bodies (e.g. competent authorities, law enforcement authorities, etc.) and authorised personnel.

AMC1 UAS.OPEN.020(5)(c) and (d), UAS.OPEN.030(3) and UAS.OPEN.040(4)(c), (d) and (e) UAS operations in subcategories A1, A2 and A3

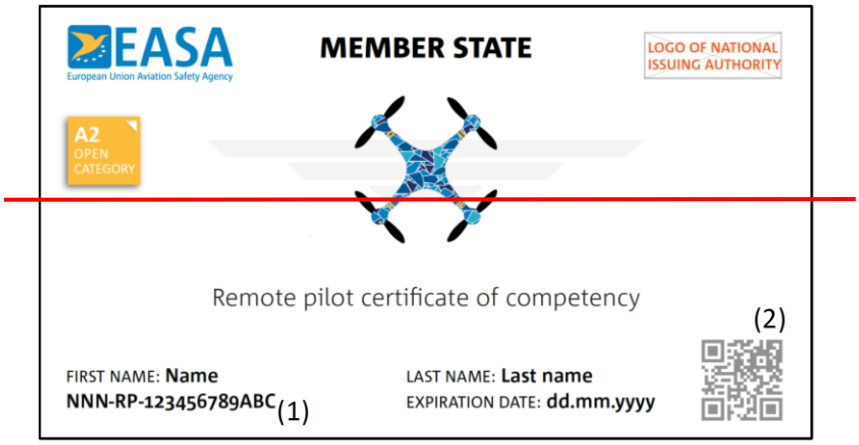
MODIFICATION OF A UAS WITH A ~~CE~~ CLASS IDENTIFICATION LABEL ~~MARK~~

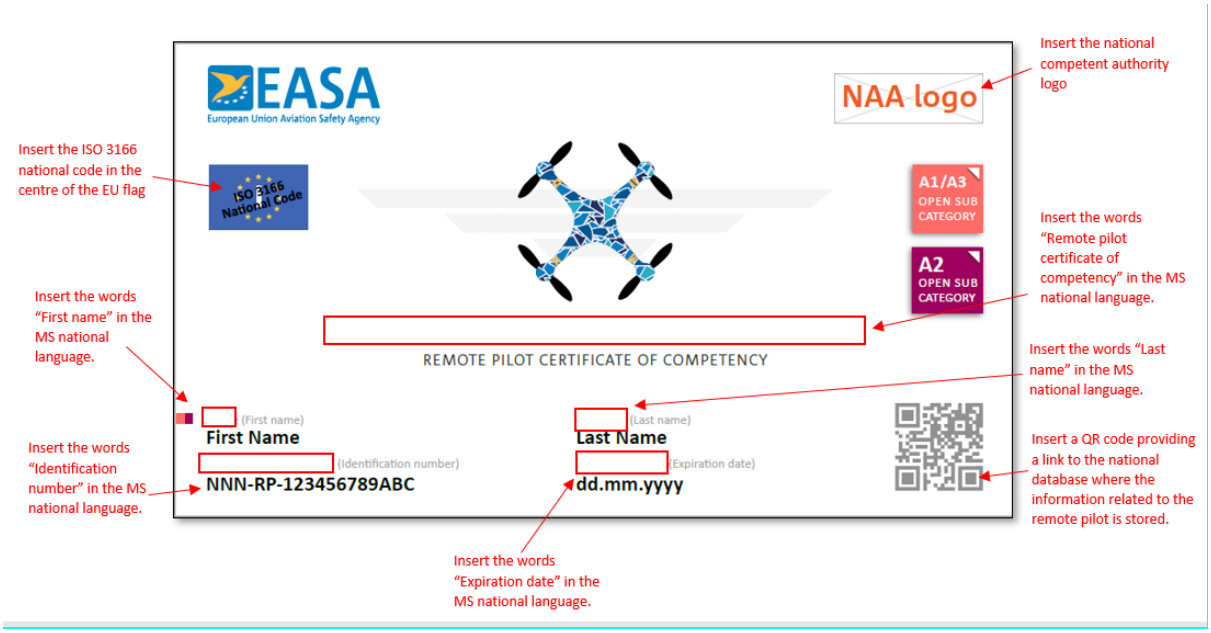
UAS operators should not make any modifications to a UAS in class C0, C1, C2, C3 or C4 that breach compliance with the product requirements. If the UAS operator carries out such a modification on a UAS, that UAS is no longer considered to have a CE Class identification label ~~mark~~ and it may only be operated ~~in Subcategory A3, or~~ in the 'specific' category in accordance with Subpart B of Annex I to the UAS Regulation.

AMC1 UAS.OPEN.030(2) UAS operations in subcategory A2

REMOTE PILOT CERTIFICATE OF COMPETENCY

After the verification that the applicant has passed the online theoretical knowledge examination, has completed and declared the ~~self-~~practical skill self-training, and has passed the additional theoretical knowledge examination provided by the competent authority or by an entity recognised by the competent authority, the ~~MS~~competent authority or the entity that is designated by the competent authority should provide a~~the following~~ certificate of competency to the remote pilot in the format depicted in the figure below. The certificate may be provided in electronic form.





~~(1) Insert the identifier~~The identification number that is provided by the competent authority or the entity that is designated by the competent authority that issues ~~releasing~~ the certificate of remote pilot competency~~. The reference~~ should have the following format:

NNN-RP-xxxxxxxxxxxx

Where:

— 'NNN' is the ISO 3166 Alpha-3 code of the MS issuing ~~releasing~~ the proof of completion;

— 'RP' is a fixed field meaning~~:~~ 'remote pilot'; and

— 'xxxxxxxxxxxx' are 12 alphanumeric characters (lower-case only) defined by the ~~MS~~competent authority or the entity that is designated by the competent authority that issues ~~releasing~~ the proof of completion.

~~As an e~~Example: (FIN-RP-123456789abc)

~~(2) QR code providing a link to the national database where the information related to the remote pilot is stored.~~ Through the 'remote pilot ~~identifier',~~ number', ~~(1)~~ all information related to the training of the remote pilot can be retrieved~~.~~ by authorised bodies (e.g. competent authorities, law enforcement authorities, etc.) and authorised personnel.

AMC2 UAS.OPEN.030(2)(a) UAS operations in subcategory A2 and Attachment A to Chapter I of Appendix 1 'REMOTE PILOT THEORETICAL KNOWLEDGE AND PRACTICAL SKILL EXAMINATION FOR STS-01'

THEORETICAL KNOWLEDGE EXAMINATION FOR THE CERTIFICATE OF REMOTE PILOT COMPETENCY AND OF THE REMOTE PILOT THEORETICAL KNOWLEDGE FOR STS

A theoretical knowledge examination to obtain a 'certificate of remote pilot competency' in subcategory A2 of the 'open' category and a 'certificate of remote pilot theoretical knowledge' for STSs should be conducted:

(1) as a face-to-face examination at the facilities of the competent authority, or the entity that is designated by the competent authority (if that entity issues the certificate), or the entity recognised by the competent authority (if the certificate is issued by the competent authority); or

(2) through an online proctored examination, where the examination provider should provide the participants in the exam with a clear procedure on how to conduct such an examination as well as with a system that:

(a) allows the adequate verification of the identity of the person that takes the examination;

(b) provides a method to verify that the person that takes the examination does not use during the examination any support other than that specified in the examination procedure;

(c) provides assistance to the person that takes the exam, as specified in the examination procedure; and

(d) enables the recording of the examination session of the person that takes the examination with due consideration of the applicable privacy and data protection regulations, to allow for a later review of that session.

AMC1 UAS.OPEN.030(2)(b) UAS operations in subcategory A2

PRACTICAL SKILL SELF-TRAINING

(a) The aim of the practical skill self-training is to ensure that the remote pilot ~~should be able to~~ demonstrates at all times the ability to:

(1) operate a class C2 UAS within its limitations;

(2) complete all manoeuvres with smoothness and accuracy;

(3) exercise good judgment and airmanship;

(4) apply their theoretical knowledge; and

(5) maintain control of the UA at all times in such a manner that the successful outcome of a procedure or manoeuvre is never seriously in doubt.

(b) The remote pilot should complete the practical skill self-training with a UAS that features the same flight characteristics (e.g. fixed wing, rotorcraft), control scheme (manual or automated,

human-machine interface) and a similar weight as the UAS intended for use in the UAS operation. This implies the use of a UA with an MTOM of less than 4 kg and bearing the Class 2 labelCE marking after the transition period relative to CE marking is closed.

(c) If a UAS with both manual and automated control schemes is used, the practical skill self-training should be performed with both control schemes. If athis UAS has multiple automated features, the remote pilot should demonstrate proficiency with each automated feature.

(d) The practical skill self-training should contain at least flying exercises regarding take-off or launch and landing or recovery, precision flight manoeuvres remaining in a given airspace volume, hovering in all orientations or loitering around positions when applicable. In addition, the remote pilot should exerciseconduct contingency procedures for abnormal situations (e.g. a return-to-home function, if available), as stipulated in the user's manual provided by the manufacturer. However, the remote pilot should only conduct those contingency procedures that do not require the deactivation of UAS functions that may reduce its safety level.

AMC2 UAS.OPEN.030(2)(b) UAS operations in subcategory A2

PRACTICAL COMPETENCIES FOR THE PRACTICAL SKILL SELF-TRAINING

When executing the practical skill self-training, the remote pilot should perform as many flights as they deem necessary to gain a reasonable level of knowledge and the skills to operate the UAS.

[…]

(b) Preparation for the flight:

(1) assess the general condition of the UAS and ensure that the configuration of the UAS complies with the instructions provided by the manufacturer in the user's manual;

(2) ensure that all removable components of the UA are properly secured;

(3) make sure that the software installed on the UAS and on the remote pilot station (RPS) is the latest published by the UAS manufacturer;

(4) calibrate the instruments on board the UA, if needed;

(5) identify possible conditions that may jeopardise the intended UAS operation;

(6) check the status of the battery and make sure it is compatible with the intended UAS operation;

(7) updateactivate the geo-awareness system and ensure that the geographical information is up to date; and

(8) set the height limitation system, if needed;

(9) set the low-speed mode; and

(10) check the correct functioning of the C2 link.

(c) Flight under normal conditions:

(1) followingusing the procedures provided by the manufacturer in the user's manual, familiarise with how to:

(i) take off (or launch)

(ii) make a stable flight:

(A) hover in case of multirotor UA;

(B) perform coordinated large turns;

(C) perform coordinated tight turns;

(D) perform straight flight at constant altitude;

(E) change direction, height and speed;

(F) follow a path;

(G) return of the UA towards the remote pilot after the UA has been placed at a distance that no longer allows its orientation to be distinguished, in case of multirotor UA;

(H) perform horizontal flight at different speed (critical high speed or critical low speed), in case of fixed-wing UA;

(iii) keep the UA outside no-fly zones or restricted zones, unless holding an authorisation;

(iv) use some external references to assess the distance and height of the UA;

(v) perform ~~return to home~~return-to-home (RTH) procedure — automatic or manual;

(vi) land (or recovery);~~ and~~

(vii) perform a landing procedure and a missed approach in case of fixed-wing UA; and

(viii) perform real-time monitoring of the status and endurance limitations of the UAS; and

(2) maintain a sufficient separation from obstacles.~~;~~

(d) Flight under abnormal conditions:

(i) manage the UAS flight path in abnormal situations;

(ii) manage a situation when the UAS positioning equipment is impaired (if the UAS used allows the deactivation of that equipment);

~~(iii) manage a situation of incursion of a person into the area of operation, and take appropriate measures to maintain safety;~~

(iii~~v~~) manage the exit from the operation zone as defined during the flight preparation;

~~(v) manage the incursion of a manned aircraft nearby the area of operation;~~

~~(vi) manage the incursion of another UAS in the area of operation;~~

(iv~~ii~~) select the safeguard mechanism relevant to a situation;

~~(viii) deal with a situation of a loss of attitude or position control generated by external phenomena;~~

(vix) resume manual control of the UAS when automatic systems render the situation dangerous; and

(vix) apply the recovery method following a deliberate (simulated) loss of the C2 link~~carry out the loss of link procedure~~.

(e) Briefing, debriefing and feedback:

(i) shut down and secure the UAS;

(ii) carry out a post-flight inspection and record any relevant data on the general condition of the UAS (its systems, components, and power sources);

(iii) conduct a review of the UAS operation; and

(~~i~~iv) identify situations when an occurrence report is necessary and complete the occurrence report.

GM1 UAS.OPEN.030(2)(c) UAS operations in subcategory A2

REMOTE PILOT COMPETENCIES REQUIRED TO OBTAIN A CERTIFICATE OF REMOTE PILOT COMPETENCY

A remote pilot may obtain the additional theoretical knowledge that is needed to pass the additional theoretical examination for a certificate of remote pilot competency~~ in one of the following two ways~~:

~~(a) Competency-based training~~

~~(1)~~ via ~~C~~competency-based training that covers aspects related to non-technical skills in an integrated manner, taking into account the particular risks associated with UAS operations.

~~(2)~~ Competency-based training should be developed using the analysis, design, development, implementation, and evaluation (ADDIE) principles.

The competency may be acquired by one of the following two ways:

(b~~a~~) Self-study, such as:

~~(1) A remote pilot may undertake self-study in many ways in order to obtain a certificate of competency. The purpose of this self-study is to acquire some basic competency and familiarise themselves with the UA, as well as with the UAS operations they want to conduct.~~

~~(2) Examples of self-study:~~

(~~i~~1) reading the manual or leaflet provided by the UA manufacturer;

(~~ii~~2) reading related information or watching instructional films; and

(~~iii~~3) obtaining information from others who have already experience in flying a UA.

(b) Study in a training facility.

~~The~~A remote pilot may also undertake this study as classroom training, e-learning or similar training at a training facility. Since this training is not mandated by the UAS Regulation~~MSs~~, the national aviation authorities (NAAs) are not required to approve the training syllabi~~uses~~.

GM2 UAS.OPEN.040(4) UAS operations in subcategory A3

USE OF UAS WITH A CLASS C0 OR C1 IDENTIFICATION LABEL IN SUBCATEGORY A3

Since subcategory A3 UAS operations are conducted at a 150-m distance from residential, commercial, and industrial areas, where no uninvolved persons are present, subcategory A3 includes also subcategory A1 (operations that are not conducted over assemblies of people and over uninvolved people). Therefore, UAS operations in subcategory A3 may also be conducted with an UA with:

(a) a class C0 identification label that complies with the requirements of Part 1 of the Annex to Regulation (EU) 2019/945; or

(b) a class C1 identification label that complies with the requirements of Part 1 of the Annex to Regulation (EU) 2019/945, as well as with an active and updated direct remote identification system and a geo-awareness function.

AMC1 UAS.OPEN.050(1) Responsibilities of the UAS operator

OPERATIONAL PROCEDURES

The UAS operator should develop procedures adapted to the type of operations and to the risks involved. Therefore, written procedures should not be necessary if the UAS operator is also the remote pilot, and the remote pilot may use the procedures defined ~~by~~in the manufacturer's instructions ~~in the operations manual (OM)~~.

[…]

GM1 UAS.SPEC.020(1)(b) Operational declaration

LOW PROBABILITY OF ENCOUNTER WITH MANNED AIRCRAFT

A low probability of encounter with manned aircraft means that the air risk can be classified as ARC-a or ARC-b in accordance with the air risk classification of AMC1 Article 11 ('SPECIFIC OPERATIONS RISK ASSESSMENT' (SORA)).

AMC1 UAS.SPEC.030(2) Application for an operational authorisation

APPLICATION FORM FOR AN~~THE~~ OPERATIONAL AUTHORISATION

The UAS operator should submit an application according to the following form. The application and all the documentation referred to or attached should be stored for 2~~two~~ years in a manner that ensures their protection from unauthorised access, damage, alteration, and theft. The declaration may be complemented by the description of the procedures to ensure that all operations are in compliance with Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, as required by point UAS.SPEC.050 (1)(a)(iv).

Application for an operational authorisation

Data protection: Personal data included in this application is processed by the competent authority pursuant to Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). Personal data will be processed for the purposes of the performance, management and follow-up of the application by the competent authority in accordance with Article 12 of Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft.

If the applicant requires further information concerning the processing of their personal data or exercising their rights (e.g. to access or rectify any inaccurate or incomplete data), they should refer to the contact point of their competent authority.

The applicant has the right to file a complaint regarding the processing of their personal data at any time to the national data protection supervisor authority.

☐ New application ☐ Amendment to operational authorisation NNN-OA-xxxxx/yyy

1. UAS operator and approval data	
1.1 UAS operator registration number	
1.2 UAS operator name	
1.3 Name of the accountable manager	
1.4 Operational point of contact Name Telephone Email	

2. Details of the UAS operation			
2.1 Expected date of start of the operation		**2.2 Expected end date**	
2.3 Operation's location(s)			
2.4 Type of operation	☐ VLOS ☐ BVLOS ☐ EVLOS		
2.5 Transport of dangerous goods	☐ Yes ☐ No		
2.6 Classification of the airspace where the operation is intended to be conducted	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G		
2.7 Risk assessment reference and revision			

2.8 Level of assurance and integrity	
2.9 Type of operational areas overflown	
2.10 Upper limit of the contingency volume	
2.11 Operational volume residual air risk level	☐ ARC-a ☐ ARC-b ☐ ARC-c ☐ ARC-d
2.12 Operations manual	
2.13 Compliance evidence file	

3. Data of authorised UAS			
3.1 Manufacturer		**3.2 Model**	
3.3 Type of UAS	☐ Aeroplane ☐ Helicopter ☐ Multirotor ☐ Hybrid/VTOL ☐ Lighter than air / other	**3.4 Max characteristic dimensions**	
3.5 TOM		**3.6 Maximum speed**	
3.7 Number of type certificate (TC) or design verification report, if available			
3.8 Certificate of airworthiness (CofA) (if available)			
3.9 Number of noise certificate (if available)			
3.10 Mitigation to reduce effect of ground impact	☐ No ☐ Yes, low ☐ Yes, medium ☐ Yes, high		
3.11 Technical requirements for containment	☐ Basic ☐ Enhanced		

4. Remarks

5. Declaration of compliance
I, the undersigned, hereby declare that the UAS operation will comply with: *— any applicable Union and national regulations related to privacy, data protection, liability, insurance, security, and environmental protection;* *— the applicable requirements of Regulation (EU) 2019/947; and* *— the limitations and conditions defined in the operational authorisation provided by the competent authority.* *Moreover, I declare that the related insurance coverage, if appliable, will be in place at the start date of the UAS operation.*

Date	**Signature**

~~**Application for operational authorisation**~~

Data protection: Personal data included in this application is processed by the competent authority pursuant to Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). It will be processed for the purposes of the performance, management and follow-up of the application by the competent authority in accordance with Article 12 of Regulation (EU) 2019/947. If you require further information concerning the processing of your personal data or exercising your rights (e.g. to access or rectify any inaccurate or incomplete data), please refer to the contact point of the competent authority. The applicant has the right to make a complaint regarding the processing of the personal data at any time to the national Data Protection Supervisor Authority.					
UAS operator data					
1.1 UAS operator registration number					
1.2 UAS operator name					
UAS data					
2.1 Manufacturer		**2.2 Model**			
2.3 Type certificate (if required)					
2.4 Serial number or UA registration mark (if applicable)					
2.5 Certificate of airworthiness (CofA) (if required)					
2.6 Noise certificate (if required)					
2.7 Configuration	☐ Aeroplane ☐ Helicopter ☐ Multirotor ☐ Hybrid/VTOL ☐ Lighter than air/other				
2.8 MTOM		**2.9 Maximum airspeed**		**2.10 Maximum characteristic dimensions**	
Operation					
3.1 ConOps					
3.2 Operation manual available	☐ yes ☐ no				
3.3 Predefined risk assessment (PDRA) (if applicable)					
3.4 If the operation complies with a PDRA published by EASA, provide all the information and documentation identified in it.					
3.5 If the operation does not comply with a PDRA published by EASA, provide the operational risk assessment in accordance with Article 11 of Regulation (EU) 2019/947					
3.6 Mitigations and operational safety objectives (OSOs)					
3.7 Insurance cover will be in place at the start of the UAS operations	☐ yes ☐ no				

~~*I, the undersigned, hereby declare that the UAS operation will comply with:*~~ ~~— *any applicable Union and national rules related to privacy, data protection, liability, insurance, security and environmental protection;*~~ ~~— *the applicable requirement of Regulation (EU) 2019/947; and*~~ ~~— *the limitations and conditions defined in the authorisation provided by the competent authority.*~~
~~**Date**~~ ~~**Signature**~~

Instructions for filling in the application form

If the application relates to an amendment to an existing operational authorisation, indicate the number of the operational authorisation and fill out in red the fields that are amended compared to the last operational authorisation.

1.1 The UAS operator registration number in accordance with Article 14 of the UAS Regulation.

1.2 Name of the UAS operator as declared during the registration process.

1.~~2~~3 Name of the accountable manager or, in the case of a natural person, the name of the UAS operator ~~in the case of a natural person~~.

1.4 Contact details of the person responsible for the operation, in charge to answer possible operational questions raised by the competent authority.

2.1 Date on which the UAS operator expects to start the operation.

2.2 Date on which the UAS operator expects to end the operation. The UAS operator may ask for an unlimited duration; in this case, indicate 'Unlimited'.

2.3 Locations where the UAS operator intends to conduct the UAS operation. Depending on the initial ground and air risk and on the application of mitigation measures, the locations may be generic or specific (e.g. defined by the geographical coordinates).

2.4 Indicate either the PDRA number and its revision, if applicable, or the risk assessment methodology used (e.g. SORA) and its revision.

2.5 Select one of the two options

2.6 Select one of the seven options

2.7 If the risk methodology used is the SORA, indicate the final SAIL of the operation.

2.8 Select one of the three options.

2.9 Characterise the ground risk (i.e. controlled ground, sparsely populated, populated, gatherings of people) for the operational and the adjacent area.

2.10 Insert the upper limit of the contingency volume using the AGL reference expressed in metres when the upper limit is below 150 m, or use the MSL reference expressed in metres and feet in parenthesis when the upper limit is above 150 m (492 ft).

2.11 Select one of the four options.

2.12 Indicate the OM's identification and revision number. This document should be attached to the application.

2.13 Indicate the compliance evidence file identification and revision number. This document should be attached to the application.

~~2~~3.1 Name of the manufacturer of the UAS.

~~2~~3.2 Model of the UAS as defined by the manufacturer.

3.3 Select one of the five options.

3.4 Indicate the maximum dimensions of the UA in metres (e.g. for aeroplanes: the length of the wingspan; for helicopters: the diameter of the propellers; for multirotors: the maximum distance between the tips of two opposite propellers) as used in the risk assessment to identify the ground risk.

3.5 Indicate the maximum value, expressed in kg, at which the operation may be authorised. The TOM maybe be different from (however, not higher than) the MTOM defined by the UAS manufacturer.

3.6 Maximum cruise airspeed, expressed in m/s and knots in parenthesis, at which the UA may be operated as used in the risk assessment to assess the energy linked to the UA.

~~2.3~~3.7 Include the EASA TC number, or the UAS design verification report number issued by EASA, if available.

~~2.4 Serial number of the UA defined by the manufacturer, or the UA registration mark if the competent authority requires the use of a UAS with an EASA TC.~~

~~2.5~~3.8 If a UAS with an EASA TC is required by the NAA, the UAS should have a certificate of airworthiness (CofA).

~~2.6~~3.9 If a UAS with an EASA TC is required, the UAS should have a noise certificate.

3.10 Select one of the four options.

3.11 Select one of the two options.

4 Free-text field for the addition of any relevant remark.

~~2.7 Configuration of the UA.~~

~~2.8 Maximum take-off mass for which the UA is designed, expressed in kg.~~

~~2.9 Maximum cruise air speed expressed in m/s and knots in parenthesis.~~

~~2.10 State the maximum dimensions of the UA in metres (e.g. for aeroplanes: the length of the wingspan; for helicopters: the diameter of the propellers; for multirotors: the maximum distance between the tips of 2 opposite propellers).~~

~~NOTE~~Note 1: Section ~~2~~3 may include more than one UAS. In that case, it should be filled in with the data of all the UASs intended to be operated. If needed, fields may be duplicated.

~~3.1 The description of the intended operation characterising the area where it will take place (i.e. urban, sparsely populated, industrial, etc.) and the airspace.~~

~~3.3 The number of the PDRA, if applicable.~~

~~3.6 A list of the mitigation measures and the OSOs put in place, as required by the PDRA or proposed by the UAS operator if no PDRA is available. Sufficient information should be provided to the competent authority to assess the robustness of the measures.~~

~~3.8 A short description of the procedures established by the UAS operator to ensure that all operations are in compliance with Regulation (EU) 2016/679 on the protection on personal data as required by point UAS.SPEC.050(1)(a)iv.~~

Note 2: The signature and stamp may be provided in electronic form.

GM1 UAS.SPEC.030(2) Application for an operational authorisation

APPLICATION FORM FOR AN~~THE~~ OPERATIONAL AUTHORISATION

[…]

(4) CONTROL AND/OR POSITIONING SYSTEM

As a general instruction for this section, in addition to the description and information deemed necessary to define these systems, provide any certification and rating for the systems, such as those related to electromagnetic compatibility or any other European Directive satisfied by the equipment installed on the aircraft, for consideration during the specific risk assessment conducted using the specific operations risk assessment (SORA) or any other risk assessment~~SMS~~ methodology to evaluate and authorise operations.

[…]

(6) FLIGHT TERMINATION SYSTEM

Describe and include the technical characteristics of the system, its modes of operation, system activation and any certification and rating for the components, as well as proof of its electromagnetic compatibility for consideration during the SORA or any other risk assessment~~SMS~~ methodology that is followed to evaluate and authorise operations.

[…]

AMC2 UAS.SPEC.030(3)(e) Application for an operational authorisation

OPERATIONAL PROCEDURES WITH MEDIUM AND HIGH LEVELS OF ROBUSTNESS

1. Scope of this AMC

1.1. This AMC addresses the criteria for the medium and high levels of robustness of the operational procedures that are required under the following OSOs:

(a) OSO #08: *Technical issue with the UAS — Operational procedures are defined, validated and adhered to*;

(b) OSO #11: *Deterioration of external systems supporting UAS operations — Procedures are in place to handle the deterioration of external systems supporting UAS operations*;

(c) OSO #14: *Human error — Operational procedures are defined, validated and adhered to*; and

(d) OSO #21: *Adverse operating conditions — Operational procedures are defined, validated and adhered to.*

These criteria may be used to also address the criteria for the medium and high levels of robustness of the operational procedures required under the mitigation means, which are defined in Annex B to AMC1 Article 11.

2. Criteria for the level of integrity

2.1. Criterion #1: Procedure definition

2.1.1. Annex E to AMC1 Article 11 provides the minimum elements that the operational procedures need to appropriately cover for the intended operations.

2.1.2. AMC1 UAS.SPEC.030(3)(e) on the OM template for the operational authorisation of UAS operations in the 'specific' category and the corresponding guidance in GM1 UAS.SPEC.030(3)(e) should be followed to define the procedures, as they provide more details on the elements that are referred to in point 2.1.1.

2.2. Criterion #2: Procedure complexity

2.2.1. Based on the SORA criterion of 'procedure complexity' for a low level of integrity, procedures with a higher level of integrity should not be complex. This implies that the workload and/or the interactions with other entities (e.g. air traffic management (ATM), etc.) of remote pilots and/or other personnel in charge of duties essential to the UAS operation should be limited to a level that may not jeopardise their ability to adequately conduct the procedures.

2.2.2. Procedures should be validated in accordance with point 3.5.

2.3. Criterion #3: Consideration of potential human error

2.3.1. Operational procedures should be developed to minimise human errors:

(a) each of the tasks and the complete sequence of the tasks of a procedure should be clearly defined, intuitive, and unambiguous;

(b) tasks should be clearly assigned to the relevant roles and persons, ensuring a balanced workload (see point 2.2); and

(c) procedures should adequately address fatigue and stress, considering, among other aspects, the following: duty times, regular breaks, rest periods, the applicable health and safety requirements in the operational environment, handover/takeover procedures, responsibilities, and workload.

2.3.2. If the level of robustness is high and more personnel are employed to ensure the safety of the operation, the UAS operator should ensure that the personnel in charge of duties essential to the UAS operation have received a crew resource management (CRM) training that addresses at least the following aspects:

(a) effective leadership; and

(b) working with others.

3. Criteria for the level of assurance

3.1. According to Annex E to AMC1 Article 11, operational procedures with a medium or high level of assurance should be validated against standards that are considered adequate by the competent authority and/or in accordance with a means of compliance acceptable to that competent authority.

3.2. The purpose of the validation process is to confirm whether the proposed operational procedures are complete and adequate to ensure the safe conduct of the intended UAS operations.

3.3. The validation process should include:

(a) a review of the completeness of the procedures to ensure that:

(1) all elements that are indicated in points 2.1.1 and 2.1.2 have been addressed; and

(2) all relevant references have been considered, including but not limited to:

(i) applicable regulations;

(ii) requirements from the competent authority and/or other relevant authorities or entities;

(iii) local requirements and conditions;

(iv) available recommended practices for the intended type of UAS operations;

(v) instructions from the UAS manufacturer and any other UAS equipment manufacturer, if applicable;

(vi) instructions and requirements from external services that support the UAS operations, if applicable; and

(vii) results from previous experience, including tests and/or simulations as those indicated in point (c) and (d);

(b) an expert judgement to assess the adequacy of the procedures based on:

(1) the objective(s) of each procedure;

(2) relevant key performance parameters/indicators and/or benchmarking of options, if applicable;

(3) an assessment of the procedures' complexity in accordance with point 2.2; and

(4) an assessment of the effect of human factors on procedures in accordance with point 2.3;

(c) a proof of the adequacy of the procedures through tests or practical exercise for phases of the UAS operation other than the UA flight, which involve the UAS and/or any external system that supports the operation;

(d) a proof of the adequacy of the contingency and emergency procedures through:

(1) dedicated flight tests;

(2) simulation, provided that it is proven valid for the intended purpose with positive results; or

(3) any other means acceptable to the competent authority of the EASA Member State;

(e) if the option in point (d)(3) is selected, a substantiation of the suitability of those means for proving the adequacy of the procedures;

(f) a record of proof of the adequacy of the procedures, including at least:

(1) the UAS operator's name and registration number;

(2) the date(s) and place(s) of tests or simulations;

(3) identification of the means used, e.g. for tests or simulations that use actual UASs: the type category, the name of the manufacturer, and the model and serial number of each UA used;

(4) a description of tests or simulations conducted, including their purpose, the expected results (including key performance parameters/indicators, where relevant), how they were conducted, the results obtained, and conclusions; and

(5) the signature of the person that is appointed by the UAS operator to conduct the tests or simulations; and

(g) for UAS operations that require a high level of assurance, the procedures and the dedicated flight tests, simulations, or other means acceptable to the competent authority, which are indicated in point 3.3, validated by the competent authority of the EASA Member State of registration or by an entity that is recognised by the competent authority.

3.4. The following conditions apply to the dedicated flight tests that are indicated in point 3.3(d)(1):

(a) the UAS operator should conduct the dedicated flight tests;

(b) if no simulations as the ones indicated in point 3.3(d)(2) are conducted, the dedicated flight tests should cover all the relevant aspects of the contingency and emergency procedures;

(c) for UAS operations that require a high level of assurance, the dedicated flight tests that are performed to validate the procedures and checklists should cover the complete flight envelope or prove to be conservative;

(d) the UAS operator should conduct as many flight tests as agreed with the competent authority to prove the adequacy of the proposed procedures;

(e) the dedicated flight tests should be conducted in a safe environment (reducing the ground and air risks to the greatest extent possible), while ensuring the representativeness of the tests' results for the intended UAS operations; and

(f) the UAS operator should record the flight tests as part of the information to be recorded as per point UAS.SPEC.050(1)(g), e.g. in a logbook, as indicated in AMC1 UAS.SPEC.050(1)(g); such a record should include any potential issues identified.

3.5. To ensure that the integrity criterion of point 2.2 is met, the complexity of the procedures should be validated.

3.5.1. This validation should include:

(a) an expert judgement, as indicated in point 3.3(b); and

(b) a proof of the adequacy of the procedures, as indicated in point 3.3(c) and (d).

3.5.2. The UAS operator should adopt a method for the evaluation of the complexity of the procedures by the relevant personnel, i.e. the remote pilot and/or other personnel in charge of duties essential to the UAS operation. That method should be adequate for the evaluation of the workload that is required by the task(s) of each procedure.

A suitable method for evaluating the workload of the remote pilot and/or other personnel in charge of duties essential to the UAS operation may be the 'Bedford Workload Scale', which was conceived as a qualitative and relatively simple methodology for rating the pilots' workload that is associated with the design of an aircraft's human-machine interface (HMI). However, this methodology is deemed generic enough to be also applicable to the tasks that are associated with the operational procedures to be conducted by remote pilots and/or other personnel in charge of duties essential to the UAS operation.

Figure 1 depicts the Bedford Workload Scale adapted to operational procedures for UAS operations: 'pilot' is replaced by 'RCM' (remote crew member, i.e. the remote pilot or other personnel in charge of duties essential to the UAS operation), and 'pilot decision' is replace by 'RCM performs a procedure task'. A procedure may include one or more tasks.

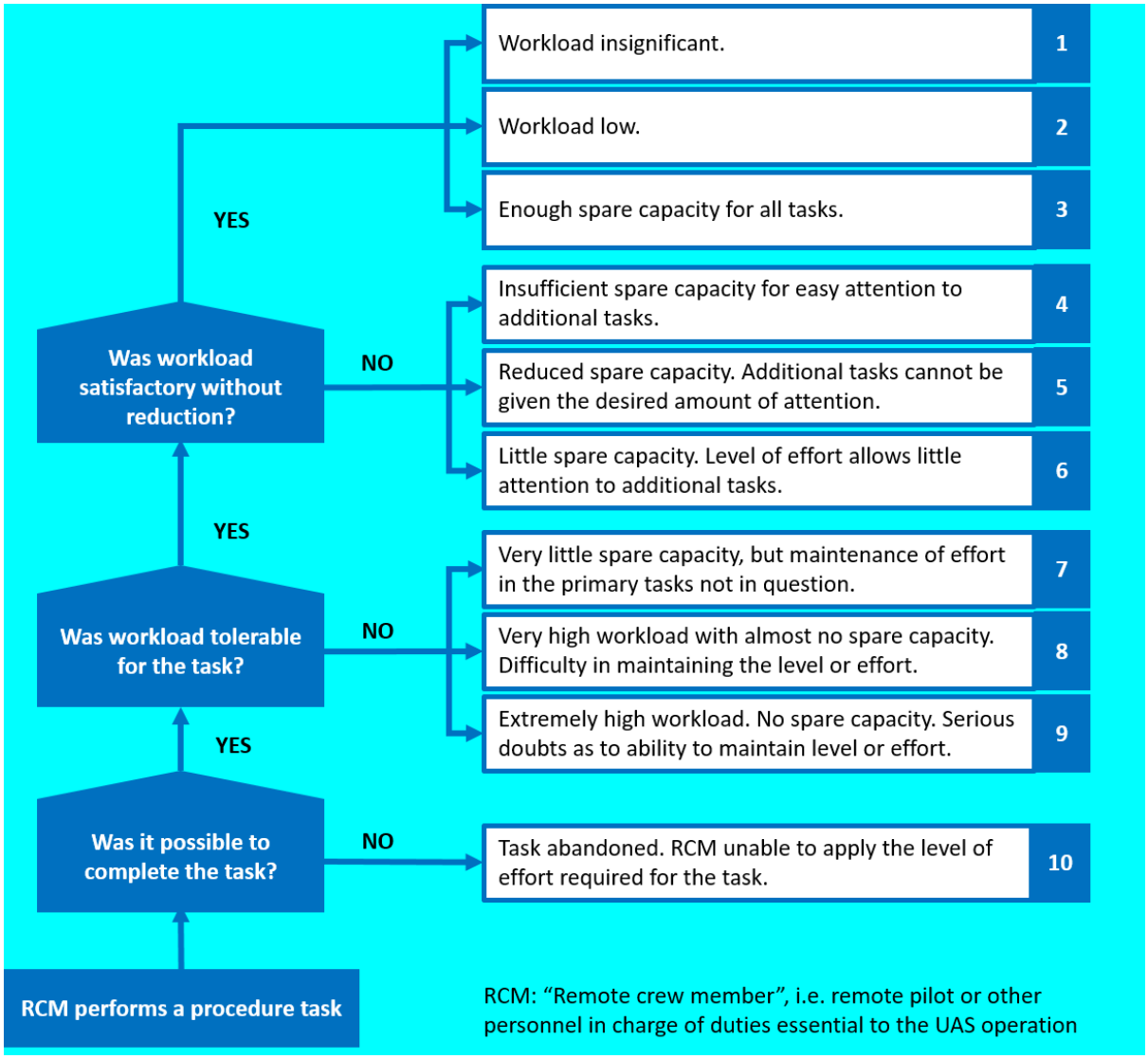


Figure 1 — Bedford Workload Scale adapted to operational procedures for UAS operations

AMC3 UAS.SPEC.030(3)(e) Application for an operational authorisation

EMERGENCY RESPONSE PLAN (ERP) WITH MEDIUM AND HIGH LEVELS OF ROBUSTNESS

1. Scope of this AMC

1.1. This AMC defines the content of an ERP as well as the methodology for its validation. It may be used to meet Criterion #1 (Procedures) of Mitigation M3 — *An ERP is in place, UAS operator validated and effective* of Annex B to AMC1 Article 11 for medium and high levels of robustness.

1.2. The risk assessment, as required by Article 11 of the UAS Regulation, should address the safety risks that are associated with the loss of control of a UAS operation, which may result in:

(a) fatal injuries to third parties on the ground;

(b) fatal injuries to third parties in the air; or

(c) damage to critical infrastructure.

Note: As per point B.4 of Annex B to AMC1 Article 11, the loss of control of a UAS operation corresponds to emergency situations where the UAS operation is in an unrecoverable state and:

— the outcome of the situation relies highly on providence; or

— the situation could not be handled via a contingency procedure; or

— there is a grave and imminent danger of fatalities.

1.3. Therefore, in line with the risk assessment, the scope of this AMC is limited to addressing the response to emergency situations that are caused by the UAS operation, as well as the potential consequences that are indicated in point **Error! Reference source not found.**. However, the response to such emergency situations should not be limited to the potential risk/harm only to third parties but also to the UAS operator personnel.

1.4. This AMC does not address other emergency situations than those referred to in point **Error! Reference source not found.**. However, the UAS operator may be required to address such situations as part of the operational authorisation[47].

2. Purpose of the ERP

2.1. The UAS operator should, in cooperation with other stakeholders, if applicable, develop, coordinate, and maintain an ERP that ensures orderly and safe transition from normal operation to emergency and return to normal operation. The ERP should include the actions to be taken by the UAS operator or specified individuals in an emergency, and

[47] Chapter 2 *Events which may activate the Emergency Response Plan* of the European Helicopter Safety Team (EHEST) *Safety Management Toolkit for Non-Complex Operators — Emergency Response Plan — A Template for Industry* (2nd edition, October 2014) provides examples of emergency situations that are outside the scope of this AMC but may be required to be addressed by the UAS operator as part of the operational authorisation (https://www.easa.europa.eu/document-library/general-publications/ehest-safety-management-toolkit-non-complex-operators-2nd).

indicate the size, nature, and complexity of the activities to be performed by the UAS operator.

2.2. As for emergency procedures, an ERP is implemented by the UAS operator to address emergency situations. However, an ERP is specifically developed to:

(a) limit any escalating effect of the emergency situation;

(b) meet the conditions to alert the relevant authorities and entities.

2.3. The ERP should contain all the necessary information about the role of the relevant personnel in an emergency and about their response to it.

3. Effectiveness of the ERP

3.1. An effective ERP should:

(a) be appropriate to the size, nature, and complexity of the UAS operation;

(b) be readily accessible by all relevant personnel and by other entities, where applicable;

(c) include procedures and checklists relevant to different or specific emergency situations;

(d) clearly define the roles and responsibilities of the relevant personnel;

(e) have quick-reference contact details of the relevant personnel;

(f) be regularly tested through practical exercises involving the relevant personnel; and

(g) be periodically reviewed and updated, when necessary, to maintain its effectiveness.

4. Emergency situations, response activation, procedures, and checklists

4.1. The ERP should define the criteria for identifying emergency situations and identify the main emergency situations that are likely to increase the level of harm (escalating effect) if no action is taken.

4.2. The identified emergency situations should at least include those in which one or more UA are operated by the UAS operator and that have the potential to:

(a) harm one or more persons;

(b) hit a ground vehicle, building, or facility where there are one or more persons who might be injured as a consequence of the UA impact;

(c) harm critical infrastructure;

(d) start a fire that might propagate;

(e) release dangerous substances;

(f) hit an aircraft that carries people and/or whose crash might lead to one or more of the situations that are listed in (a) to (e); and

(g) cause the UA to leave the operational volume and fly beyond the limits of:

(2) the ground risk buffer; and/or

(3) the air risk buffer (if existing) or enter an adjacent airspace where the risk of collision with manned aircraft is higher than within the operational volume.

4.3. The ERP should establish the criteria for the activation of the respective emergency response procedures to address the identified emergency situations.

4.4. As a minimum, the ERP should include procedures for:

(a) an orderly transition from the normal phase to the emergency response phase;

(b) the assignment of emergency responsibilities and roles (see point **Error! Reference source not found.**);

(c) coordinated action and interaction with other entities to respond to the emergency situation; and

(d) return to normal operation, as soon as practicable.

4.5. The ERP should consider the following principles for prioritising the actions to respond to an emergency situation:

(a) alert the relevant personnel and entities;

(b) protect the life of those affected or in danger;

(c) give first aid while awaiting the arrival of the emergency services, provided the personnel employed by the UAS operator is qualified for that purpose;

(d) ensure the safety of the emergency responders;

(e) keep the emergency situation under control or contained;

(f) protect property;

(g) restore the normal situation, as soon as practicable;

(h) record the emergency situation and the response to it, and preserve evidence for further investigation;

(i) remove damaged items, unless needed untouched for investigation, and restore the location of the emergency;

(j) debrief the relevant personnel;

(k) prepare any required post-emergency report or notification; and

(l) evaluate the effectiveness of the ERP and update it, if required.

4.6. The ERP should include a procedure for recording the information on the emergency situation and on the subsequent response. That procedure should also cover how to gather information from a third party that reports an emergency situation caused by a UA of the UAS operator.

4.7. The ERP should include procedures for handling hazardous materials in an emergency situation, if applicable.

4.8. The ERP should include checklists that:

(a) are suitable for the identified emergency situations, as per point **Error! Reference source not found.**;

(b) clearly indicate the sequence of actions and the personnel responsible to carry out those actions; and

(c) provide the contact details of key stakeholders, as per point **Error! Reference source not found.**.

4.9. The content of the ERP should be kept up to date and reflect all organisational or operational changes that may affect it.

5. Roles, responsibilities, and key contacts

5.1. The UAS operator should nominate an emergency response manager (ERM) who has the overall responsibility for the emergency response.

5.2. If the UAS operator is not a one-person entity and/or manages external personnel in an emergency response, the UAS operator should establish an emergency response team (ERT) that:

(a) is led by the ERM;

(b) includes a core ERT that is formed by persons with a role that implies being directly affected by an emergency situation; and

(c) includes, if applicable, a support ERT that is formed by ERT members who support the core ERT in responding to the emergency situation.

5.3. The ERP should provide a clear delineation of the responsibilities in an emergency response, including the duties of the remote pilot(s) and any other personnel in charge of duties essential to the UAS operation.

5.4. The ERP should establish a contact list(s) of key persons, relevant authorities, and entities involved in an emergency response, including:

(a) the full names, roles, responsibilities, and contact details of the ERM and, if applicable, of the ERT members, including their alternates if the nominated persons are unavailable; and

(b) the full names, roles, responsibilities, and contact details of the relevant authorities and entities outside the UAS operator to be contacted in case of emergency; in addition, the single European emergency call number '112' should be indicated as an emergency contact number for UAS operations that are conducted in any of the EASA Member States and in any other State where that number is used.[48]

[48] Chapter 5 *Reaction to an emergency call* of the European Helicopter Safety Team (EHEST) *Safety Management Toolkit for Non-Complex Operators — Emergency Response Plan — A Template for Industry* (2nd edition, October 2014) (https://www.easa.europa.eu/document-library/general-publications/ehest-safety-management-toolkit-non-complex-operators-2nd), and the 'primary accident information sheet' in its Section 5.1 may be a suitable reference for developing a procedure to indicate how to gather information from a third party on an emergency involving a UA of the UAS operator. Section 6.5 *Crisis Log* provides an example of a 'crisis log' that might be useful for developing a template to record the emergency situation and the response to it.

5.5. The ERP should indicate the person(s) responsible for the emergency response means that are listed in point **Error! Reference source not found.** and their contact details. The responsible person(s) should ensure that those means are available and usable when needed.

5.6. To ensure a prompt response, the ERM and other ERT members, if applicable, should have direct access to:

(a) the emergency response checklists that are indicated in point **Error! Reference source not found.**; and

(b) if not included in the checklists referred to in (a), the contact list(s) indicated in point **Error! Reference source not found.**.

6. Emergency response means

6.1. The ERP should indicate the means to be used by the UAS operator to respond to an emergency, which may include one or more of the following:

(a) facilities, infrastructure, and equipment;

(b) extinguishing means, e.g. fire extinguishers;

(c) personal protective equipment, e.g. protective clothing, high-visibility clothing, helmets, goggles, gloves;

(d) medical means, including first-aid kits;

(e) communication means, e.g. phones (landline and mobile), walkie-talkies, aviation radios, internet; and

(f) others.

6.2. The person(s) in charge of the emergency response means should have an updated record of the available means that are indicated in point **Error! Reference source not found.**, including their number and status (e.g. expiry date of perishable means).

7. ERP validation

7.1. If the UAS operator is a one-person entity and does not manage external personnel in an emergency response, the UAS operator should at least ensure that:

(a) the procedures that are indicated in point **Error! Reference source not found.** cover all the identified emergency situations and that the necessary actions are reflected in the corresponding checklist(s);

(b) the contact details in the list(s) indicated in point **Error! Reference source not found.** are up to date; and

(c) the availability of the emergency response means that are indicated in point **Error! Reference source not found.** is checked before conducting any UAS operation, in particular, that the communication means to alert the relevant contacts (see point (b)) are operational.

7.2. If the UAS operator is not a one-person entity and/or manages external personnel in an emergency response, in addition to complying with point **Error! Reference source not found.**, the UAS operator should conduct a tabletop exercise[49] that:

(a) is established in accordance with the criteria that are indicated in the ERP to be considered representative;

(b) is consistent with the ERP training syllabus;

(c) includes sessions where one or more scenarios of the identified emergency situations are discussed by the exercise participants, which should include the relevant ERT members for each of the sessions; all aspects of the ERP should be covered once all sessions of the tabletop exercise have been completed;

(d) is guided by the ERM or any other person designated by the UAS operator to act as a facilitator;

(e) may include the participation of third parties that are identified in the ERP; the participation conditions for those third parties should be indicated in the ERP; and

(f) is performed with the periodicity that is indicated in the ERP.

However, if the UAS operator is a one-person entity and does not manage external personnel in an emergency response, a tabletop exercise may not be appropriate as the participation of third parties is not required. In such case, the conditions of point **Error! Reference source not found.** are deemed sufficient and proportionate to the level of simplicity of the operator and, in principle, of the UAS operations.

For UAS operators with a more complex structure as well as for complex UAS operations, the tabletop exercises may need to be complemented with partial emergency exercises and/or full-scale exercises, including the corresponding drills. If the level of robustness that is required or claimed for the ERP is high, such exercises and drills are needed.

7.3. Depending on the level of risk of the UAS operation[50], the competent authority may require that:

(a) the ERP and its effectiveness with respect to limiting the number of people at risk be validated by the competent authority itself or by an entity designated by the competent authority;

(b) the UAS operator should coordinate and agree the ERP with all third parties that are identified in the plan; and

[49] Please refer to GM2 ADR.OPS.B.005(c) *Aerodrome emergency planning* (see AMC and GM to Authority, Organisation and Operations Requirements for Aerodromes), which defines the following three categories of exercises for emergency planning:
(a) full-scale exercises;
(b) partial emergency exercises; and
(c) tabletop exercises.

[50] For example, when the operation is conducted in a controlled area with a higher air risk.

(c) the representativeness of the tabletop exercise is validated by the competent authority of the EASA Member State of registration or by an entity that is designated by the competent authority.

7.4. After using the procedures that are described in the ERP in a real emergency situation, the UAS operator should conduct an analysis of the way the emergency was managed and verify the effectiveness of the ERP.

8. ERP training

8.1. The UAS operator should provide relevant personnel, and in particular ERT members, with ERP training.

8.2. The UAS operator should develop a training syllabus that covers all the elements of the ERP.

8.3. The UAS operator should compile and keep up to date a record of the ERP training that is completed by the relevant personnel.

8.4. The competent authority of the EASA Member State of registration or an entity that is designated by the competent authority should verify the competencies of the relevant personnel if the level of assurance that is required or claimed for the ERP is high.

GM1 UAS.SPEC.030(3)(e) Application for an operational authorisation

OPERATIONS MANUAL — TEMPLATE

[…]

'7. Emergency response plan (ERP)'

See AMC3 UAS.SPEC.030(3)(e).~~When the UAS operator develops an ERP, the following should be considered:~~

~~(a) it is expected to cover:~~

~~(1) the plan to limit crash-escalating effects (e.g. notify the emergency services and other relevant authorities); and~~

~~(2) the conditions to alert ATM.~~

~~(b) it is suitable for the situation;~~

~~(c) it limits the escalating effects;~~

~~(d) it defines criteria to identify an emergency situation;~~

~~(e) it is practical to use;~~

~~(f) it clearly delineates the responsibilities of the personnel in charge of duties essential to the UAS operation;~~

~~(g) it is developed to standards considered adequate by the competent authority and/or in accordance with means of compliance acceptable to that authority; and~~

~~(h) when considered appropriate by the competent authority, to be validated through a representative tabletop exercise1 consistent with the ERP training syllabus.~~

AMC1 UAS.SPEC.040(1) Operational authorisation

OPERATIONAL AUTHORISATION TEMPLATE

The competent authority should produce the operational authorisation according to the following form:

	Operational authorisation for the 'specific' category	NAA Logo

1. Authority issuing the authorisation		
1.1 Issuing authority		
1.2 Contact person **Name** **Telephone** **Email**		
2. UAS operator data		
2.1 UAS operator registration number		
2.2 UAS operator name		
2.3 Operational point of contact **Name** **Telephone** **Email**		
3. Authorised operation		
3.1 Authorised location(s)		
3.2 Risk assessment reference and revision		
3.3 Level of assurance and integrity		
3.4 Type of operation		☐ VLOS ☐ BVLOS ☐ EVLOS
3.5 Transport of dangerous goods		☐ Yes ☐ No
3.6 Type of operational areas overflown		
3.7 Upper limit of the contingency volume		
3.8 Operational volume residual air risk level		☐ ARC-a ☐ ARC-b ☐ ARC-c ☐ ARC-d
3.9 Ground risk mitigations	**3.9.1 Strategic mitigations**	☐ No ☐ Yes, low ☐ Yes, medium ☐ Yes, high
	3.9.2 ERP	☐ No ☐ Yes, low ☐ Yes, medium ☐ Yes, high
3.10 Air risk mitigations	**3.10.1 Strategic mitigations**	☐ No ☐ Operational restrictions ☐ Common rules and structures
	3.10.2 Tactical mitigations methods	
3.11 Achieved level of containment		☐ Basic ☐ Enhanced
3.12 Remote pilot competency		
3.13 Competency of staff, other than the remote pilot, essential for the safety of the operation		

3.14 Type of events to be reported to the competent authority (in addition to those required by Regulation (EU) No 376/2014)			
3.15 Insurance		☐No ☐Yes	
3.16 Operations manual			
3.17 Compliance evidence file			
3.18 Additional limitations			
4. Data of authorised UAS			
4.1 Manufacturer		**4.2 Model**	
4.3 Type of UAS	☐Aeroplane ☐Helicopter ☐Multirotor ☐Hybrid/VTOL ☐Lighter than air / other	**4.4 Max characteristic dimensions**	
4.5 TOM		**4.6 Maximum speed**	
4.7 Additional technical requirements			
4.8 Number of type certificate (TC) or design verification report, if required			
4.9 Certificate of airworthiness (CofA) (if required)			
4.10 Number of noise certificate (if required)			
4.11 Mitigation to reduce effect of ground impact		☐No ☐Yes, low ☐Yes, medium ☐Yes, high	
4.12 Technical requirements for containment		☐ Basic ☐ Enhanced	
5. Remarks			
3. Operational authorisation			
..... (UAS operator name) is authorised to conduct UAS operations with the UAS(s) defined in Section 3 and according to the conditions and limitations defined in Section 4, as long as it complies with this operational authorisation, with Regulation (EU) 2019/947 and with any applicable Union and national regulations related to privacy, data protection, liability, insurance, security, and environmental protection.			
6.1 Operational authorisation number			
6.2 Expiration date			
Date	**Signature and stamp**		

~~**Operational authorisation**~~

NAA Log

~~**1. AUTHORITY RELEASING THE AUTHORISATION**~~

~~**1.1 State of the UAS operator**~~			
~~**1.2 Issuing authority**~~			
~~**1.3 Contact person**~~ ~~Name~~ ~~Telephone~~ ~~Email~~			
~~**2. UAS operator data**~~			
~~**2.1 UAS operator registration number**~~			
~~**2.2 UAS operator name**~~			
~~**2.3 Operational point of contact**~~ ~~Name~~ ~~Telephone~~ ~~Fax~~ ~~Email~~			
~~**2.4 Authorisation number**~~			
~~**3. Data of authorised UAS**~~			
~~**3.1 Brand**~~		~~**3.2 Model**~~	
~~**3.3 3.3 Type certificate (TC) (if required)**~~			
~~**3.4 Serial number or UA registration mark (for certified UAS)**~~			
~~**3.5 Certificate of airworthiness (CofA) (if required)**~~			
~~**3.6 Noise certificate (if required)**~~			
~~**3.7 Requirements for continuing airworthiness**~~			
~~**4. Limitations and conditions for the UAS operation**~~			
~~**4.1 Authorised location(s)**~~			
~~**4.2 Authorised airspace risk level**~~			
~~**4.3 Operational limitations**~~			
~~**4.4 Mitigation measures**~~			

~~**4.5 Remote pilot competency**~~	
~~**4.6 Competency of other staff essential for the safety of the operation**~~	
~~**4.7 Records to be kept**~~	
~~**4.8 Type of events to be reported to the competent authority according to Regulation (EU) No 376/2014**~~	
~~**4.9 Expiry date**~~	
~~The…… (2.2) is authorised to conduct UAS operations with the UAs defined in Section 3 and according to the conditions and limitations defined in Section 4, if it complies with this authorisation, as well as with Annex IX to Regulation (EU) 2018/1139 and its implementing rules.~~	
~~**Date, signature and stamp**~~	

Instructions for filling in the form

1.1 Name of the competent authority that issues the operational authorisation, including the name of the State ~~of the UAS operator~~.

~~1.2 Identification of the issuing competent authority.~~

1.~~3~~2 Contact details data of the competent authority person ~~of~~ responsible for issuing the authorisation.

2.1 Registration information of the UAS operator in accordance with Article 14 of the UAS Regulation.

2.2 UAS operator's ~~registered first~~ name, as registered in the UAS operator registration database ~~and surname or, in the case of a legal entity, the business name~~.

2.3 ~~The c~~Contact details data of the person responsible for the operations, in charge to answer possible operational questions raised by the competent authority ~~details include the telephone and fax numbers, including the country code, and the email address at which the accountable manager and the safety manager can be contacted~~.

~~2.4 Reference number, as issued by the competent authority.~~

3.1 Depending on the initial ground and air risk and on the application of mitigation measures, the location(s) may be generic or specific (e.g. defined by the geographical coordinates).

3.2 Indicate either the PDRA number and its revision, if applicable, or the risk assessment methodology used (e.g. SORA) and its revision.

3.3 If the risk methodology used is the SORA, indicate the final SAIL of the operation.

3.4 Select one of the three options.

3.5 Select one of the two options

3.6 Characterise the ground risk (i.e. controlled ground, sparsely populated, populated, gatherings of people) for the operational and the adjacent area.

3.7 Insert the upper limit of the contingency volume using the AGL reference, expressed in metres, when the upper limit is below 150 m, or use the MSL reference, expressed in metres and feet in parenthesis, when the upper limit is above 150 m (492 ft).

3.8 Select one of the four options.

3.9.1 Select one of the four options.

3.9.2 Select one of the four options.

3.10.1 Select one of the three options.

3.10.2 Describe the tactical mitigation methods to be applied by the UAS operator.

3.11 Select one of the two options.

3.12 Specify the type of the remote pilot certificate, if required; otherwise, indicate 'Declared'.

3.13 Specify the type of the certificate for the staff, other than the remote pilot, essential for the safety of the operation, if required; otherwise, indicate 'Declared'.

3.14 List the type of events that the UAS operator should report to the competent authority, in addition to those required by Regulation (EU) No 376/2014, if applicable.

3.15 Select one of the two options.

3.16 Indicate the OM's identification and revision number.

3.17 Indicate the compliance evidence file identification and revision number.

3.18 Additional limitations defined by the competent authority.

~~3~~4.1 Name of the manufacturer of the UAS.

~~3~~4.2 Model of the UAS as defined by the manufacturer.

4.3 Select one of the five options.

4.4 Indicate the maximum dimensions of the UA in metres (e.g. for aeroplanes: the length of the wingspan; for helicopters: the diameter of the propellers; for multirotors: the maximum distance between the tips of two opposite propellers) as used in the risk assessment to identify the ground risk.

4.5 Indicate the maximum value, expressed in kg, at which the operation may be authorised. The TOM maybe be different from (however, not higher than) the MTOM defined by the UAS manufacturer.

4.6 Maximum cruise airspeed, expressed in m/s and knots in parenthesis, at which the UA may be operated as used in the risk assessment to assess the energy linked to the UA.

4.7 List any additional technical requirements imposed by the competent authority.

~~3.3~~4.8 Include the EASA TC number, or the UAS design verification report number issued by EASA, if the competent authority requires the use of a UAS with an EASA TC, or a design verification report.

~~3.4 Serial number of the UA defined by the manufacturer or UA registration mark if the competent authority requires the use of a UAS with an EASA TC.~~

~~3.5~~4.9 If a UAS with an EASA ~~type certificate (~~TC~~)~~ is required, the UAS should have a certificate of airworthiness (CofA) ~~and a noise certificate,~~ and the competent authority should require compliance with the continuing airworthiness ~~continuing airworthiness~~ rules.

4.10 If a UAS with an EASA TC is required, the UAS should have a noise certificate.

4.11 Select one of the four options.

4.12 Select one of the two options.

5 Free-text field for the addition of any relevant remark.

6.1 Reference number of the operational authorisation, as issued by the competent authority. The number should have the following format:

NNN-OA-xxxxx/yyy

Where:

— 'NNN' is the ISO 3166 Alpha-3 code of the Member State that issues the operational authorisation;

— 'OA' is a fixed field meaning 'operational authorisation';

— 'xxxxx' are 5 alphanumeric characters defining the operational authorisation number; and

— 'yyy' are 3 alphanumeric characters defining the revision number of the operational authorisation. Each amendment of the operational authorisation will determine a new revision number.

6.2 The duration of the operational authorisation may be unlimited; in this case, indicate 'Unlimited'. The authorisation will be valid as long as the UAS operator complies with the relevant requirements of the UAS Regulation and with the conditions defined in the operational authorisation.

~~4.1 Locations where the UAS operation has been authorised.~~

~~4.2 Characterisation of the authorised airspace (i.e. low risk — ARC-a, medium risk — ARC-b, high risk — ARC-C).~~

~~4.3 List the operational limitations, including at least:~~

~~1.the maximum height;~~

~~2.limitations on the payload;~~

~~3.limitations on the operations (i.e. the possibility to hand over to another remote pilot during the flight);~~

~~4.the minimum contents of the OM;~~

~~5.the methodology to verify the operational procedures;~~

~~6.the need for an emergency response plan (ERP);~~

~~7.the maintenance requirements; and~~

~~8.the record-keeping requirements.~~

~~4.4 List the mitigation measures (including the definition of a specific authorised flight path, if applicable)[51].~~

~~4.5 The minimum competency required for the remote pilot and the methodology to assess it.~~

~~4.6 The minimum competency required for the staff essential for the operation (i.e. maintenance staff, the launch and recovery assistant, UA AO, etc.) and the methodology to assess it.~~

Note 1: In section 4, more than one UAS may be listed. If needed, the fields may be duplicated.

Note 2: The signature and stamp may be provided in electronic form. The quick response (QR) code should provide the link to the national database where the operational authorisation is stored.

[51] In case of cross-border UAS operations, this information will be revised by the NAA of the Member State of operation.

~~GM~~AMC1 UAS.SPEC.050(1)(d) and UAS.SPEC.050(1)(e) Responsibilities of the UAS operator

THEORETICAL KNOWLEDGE SUBJECTS FOR THE TRAINING OF THE REMOTE PILOT AND ALL PERSONNEL IN CHARGE OF DUTIES ESSENTIAL TO THE UAS OPERATION~~TRAINING FOR~~ IN THE 'SPECIFIC' CATEGORY

(a) The 'specific' category may cover a wide range of UAS operations with different levels of risk. The UAS operator is therefore required to identify the competency required for the remote pilot ~~and all the personnel in charge of duties essential to the UAS operation,~~ according to the outcome of the risk assessment. This AMC covers the theoretical knowledge subjects while AMC2 UAS.SPEC.050(1)(d) covers the practical knowledge subjects applicable to all UAS operations in the 'specific' category. In addition, for both theoretical and practical knowledge subjects, the UAS operator should select the relevant additional modules from AMC3 UAS.SPEC.050(1)(d), as applicable to the type of UAS operation. The UAS operator should achieve a level of robustness consistent with the SAIL of the intended UAS operation.

(b) When the UAS operation is conducted according to ~~a~~one of the STSs that are listed in Appendix 1 to the UAS Regulation, the UAS operator ~~must~~should ensure that the remote pilot has the competency that is defined in the STS. In all other cases, the UAS operator ~~may~~should propose to the competent authority~~NAA~~, as part of the application, a theoretical knowledge training course for the remote pilot based on the elements that are listed in AMC1 UAS.OPEN.020(4)(b) and ~~in~~ UAS.OPEN.0~~3~~40(3~~2~~), which are relevant for the intended operation, complemented by the ~~following~~ elements listed below~~subjects.~~ The UAS operator may use the same listed topics to propose also for the other personnel in charge of duties essential to the UAS operation a theoretical knowledge training course with competency-based theoretical training specific to the duties of such personnel.

(1) ~~a~~Air safety:

(i) remote pilot records;

(ii) logbooks and associated documentation;

(iii) good airmanship principles;

(iv) aeronautical decision-making;

(v) aviation safety;

(vi) air proximity reporting; and

(vii) advanced airmanship:

(A) manoeuvres and emergency procedures; and

(B) general information on unusual conditions (e.g. stalls, spins, vertical lift limitations, autorotation, vortex ring states)~~;~~.

(2) ~~a~~Aviation regulations:

(i) introduction to the UAS Regulation with focus on the 'specific' category;

(ii) risk assessment, introduction to SORA; and

(iii) overview of STSs and the PDRA~~;~~.

(3) ~~n~~Navigation:

(i) navigational aids (e.g. GNSS) and their limitations ~~(e.g. GNSS)~~;

(ii) reading maps and aeronautical charts (e.g. 1:500 000 and 1:250 000, interpretation, specialised charts, helicopter routes, U-space service areas, and understanding of basic terms); and

(iii) vertical navigation (e.g. reference altitudes and heights, altimetry)~~;~~.

(4) ~~h~~Human performance limitations:

(i) perception (situational awareness in BVLOS operations); ~~and~~

(ii) fatigue:

(A) flight durations within work hours;

(B) circadian rhythm~~s~~;

(C) work stress; and

(D) commercial pressure~~s~~; and

(iii) attentiveness:

(A) eliminating distractions; and

(B) scan techniques;

(iv) medical fitness (health precautions, alcohol, drugs, medication, etc.); and

(v) environmental factors such as vision changes from orientation to the sun.~~;~~

(5) Airspace operating principles~~operational procedures~~:

(i) airspace classifications and operating principles;

(ii) U-space;

(ii~~i~~) procedures for airspace reservation;

(iv~~ii~~) aeronautical information publications; and

(~~i~~v) NOTAM.~~s; and~~

~~(v) mission planning, airspace considerations and site risk-assessment:~~

~~(A) measures to comply with the limitations and conditions applicable to the operational volume and the ground risk buffer for the intended operation; and~~

~~(B) BVLOS operations. Use of UA VOs;~~

(6) UAS general knowledge:

(i) loss of signal and system failure protocols — understanding the condition and planning for programmed responses such as returning to home, loiter, landing immediately;

(ii) flight termination systems; ~~and~~

(iii) flight control modes;

(iv) the means to monitor the UA (its position, height, speed, C2 Link, systems status, etc.);

(v) the means of communication with the VOs; and

(vi) the means to support air traffic awareness.

(7) ~~m~~Meteorology:

(i) obtaining and interpreting advanced weather information:

(A) weather reporting resources;

(B) reports;

(C) forecasts and meteorological conventions appropriate for typical UAS flight operations;

(D) local weather assessments;

(E) low-level charts; and

(F) METAR, SPECI, TAF;

(ii) regional weather effects — standard weather patterns in coastal, mountain or desert terrains; and

(iii) weather effects on the UA (wind, storms, mist, variation of wind with altitude, wind shear, etc.). ~~; and~~

(8) Technical and operational mitigation measures for air risks: ~~emergency response plan (ERP) —~~

(i) EVLOS by employing airspace observers (AOs); and

(ii) principles of detect and avoid (DAA).

(9) Operational procedures:

(i) mission planning, airspace considerations, and site risk assessment:

(A) measures to comply with the limitations and conditions applicable to the operational volume and to the ground risk buffer for the intended UAS operation;

(B) UAS operations over a controlled ground area;

(C) BVLOS operations;

(D) use of UA VOs;

(ii) multi-crew cooperation (MCC):

(A) coordination between the remote pilot and other personnel (e.g. AOs) in charge of duties essential to the UAS operation;

(B) crew resource management (CRM):

(a) effective leadership;

(b) working with others.

(10) Managing data sources regarding:

(i) where to obtain the data from;

(ii) the security of the data;

(iii) the quantity of the data needed; and

(iv) the impact on the storage of data.

(~~8~~c) emergency response plan (ERP) —~~-~~ the UAS operator should provide its personnel with competency-based theoretical training covering the ERP that includes the related proficiency requirements and recurrent training.

(d) The training and assessment should be appropriate to the level of automation of the UAS operation.

~~(c) The UAS operator may define additional aspects from the subjects mentioned in point (b) based on the UAS operations intended to be conducted:~~

~~(1) operational procedures;~~

~~(i) mission planning, airspace considerations and site risk-assessment — operations over a controlled ground area;~~

~~(ii) multi crew cooperation (MCC):~~

~~(A) coordination between the remote pilot and other personnel in charge of duties essential to the UAS operation (i.e. VO);~~

~~(B) crew resource management (CRM):~~

~~(a) effective leadership; and~~

~~(b) working with others;~~

~~(2) UAS general knowledge — the means supporting BVLOS operations:~~

~~(i) the means to monitor the UA (its position, height, speed, C2 Link, systems status, etc.);~~

~~(ii) the means of communication with VOs; and~~

~~(iii) the means to support air traffic awareness.~~

AMC2 UAS.SPEC.050(1)(d) and UAS.SPEC.050(1)(e) Responsibilities of the UAS operator

PRACTICAL SKILL TRAINING FOR THE REMOTE PILOT AND ALL PERSONNEL IN CHARGE OF DUTIES ESSENTIAL TO THE UAS OPERATION IN THE 'SPECIFIC' CATEGORY

(a) Regarding the practical skill training and assessment for the remote pilot, the UAS operator should consider the competencies that are defined in AMC2 UAS.OPEN.030(2)(b), complemented by the items listed below. The UAS operator should adapt the practical skill training to the characteristics of the UAS operation and to the functions available on board the UAS. The UAS operator may use the same listed topics to propose a practical training course also for the other personnel in charge of duties essential to the UAS operation.

(1) Preparation of the UAS operation:

(i) implement the necessary measures to comply with the limitations and conditions applicable to the operational volume and to the ground risk buffer for the intended UAS operation in accordance with the OM procedures;

(ii) apply the necessary procedures for UAS operations in controlled airspace, including a protocol to communicate with the ATC and obtain clearance and instructions, if necessary;

(iii) confirm that all necessary documents for the intended UAS operation are on-site;

(iv) brief all participants on the planned UAS operation;

(v) perform airspace scanning; and

(vi) if AOs are employed, place them adequately and prepare a deconfliction scheme that includes phraseology.

(2) Preparation for the flight:

(i) ensure that all the safety systems and functions of the UAS, including its height and speed limitation systems, flight termination system, and triggering system, are operational; and

(ii) know the basic actions to be taken in the event of an emergency, including issues with the UAS, or a mid-air collision hazard arising during the flight.

(3) Flight under abnormal conditions:

(i) manage a partial or complete power shortage of the UA propulsion system, while ensuring the safety of third parties on the ground;

(ii) manage a situation of a non-involved person entering the operational volume or the controlled ground area, and take appropriate measures to maintain safety; and

(iii) react to, and take the appropriate corrective actions for, a situation where the UA is likely to exceed the limits of both the flight geography (contingency procedures) and of the operational volume (emergency procedures) as they were defined during the flight preparation.

(4) In general, emphasis should be placed on the following:

(i) normal, contingency, and emergency procedures;

(ii) skill tests combined with periodic proficiency checks;

(iii) operating experience (with on-the-job training counting towards proficiency);

(iv) pre-flight and post-flight procedures and documentation;

(v) recurrent training (UAS / flight training device (FTD)); and

(vi) remote pilot incapacitation.

(b) The practical skill training may be conducted on the UAS or on an FTD. Scenario-based training (SBT) with highly structured, real-world experience scripts for the specific UAS operation should be used to fortify personnel's learning in an operational environment and improve situational awareness. SBT should include realistic normal, abnormal, and emergency scenarios that are drafted considering specific learning objectives.

(c) The practical skill training is checked during the assessment and can be provided using the actual UAS or an FTD appropriate to the specific UAS operation.

(d) Initial and recurrent training

(1) The UAS operator should ensure that specified minimum requirements regarding the time of the initial and recurrent training (e.g. duration and number of flight hours) are provided for in a manner that is acceptable and approved by the competent authority.

(2) Depending on the training course, each of the topics shown in Table 1 below may require only overview training or in-depth training. In-depth training should be interactive and include discussions, case-study reviews, and role play, as deemed necessary to enhance learning.

Topic	Initial training	Change of UAS	Change of remote pilot/crew	Recurrent training
Situational awareness and error management	In-depth	In-depth	Overview	Overview
Organisational safety culture, operational procedures, organisational structure	In-depth	Not required	In-depth	Overview
Stress management, fatigue, and vigilance	In-depth	Not required	Not required	Overview
Decision-making	In-depth	Overview	Not required	Overview

Automation, philosophy of the use of automation	As required	In-depth	In-depth	As required
Specific UAS type-related differences	As required	In-depth	Not required for the same UAS type)	As required
Case-based studies	In-depth	In-depth	In-depth	As required

Table 1 — Level of practical skill training in several topics depending on initial training, recurrent training, or change of UAS / remote pilot / crew

AMC3 UAS.SPEC.050(1)(d) Responsibilities of the UAS operator

UAS OPERATION-SPECIFIC ENDORSEMENT MODULES

Depending on the type and risk of the intended UAS operation, the UAS operator may propose, as part of the application for an operational authorisation, additional theoretical knowledge training in combination with the practical skill training that is specific to the intended UAS operation as described in the OM.

The practical skill training should at least contain the practical competencies that are described in AMC2 UAS.OPEN.030(2)(b) 'UAS operations in subcategory A2', which may include relevant emergency and contingency procedures. However, the UAS operator may adapt that training to the level of automation of the UAS.

During the practical skill training, the remote pilot should list the relevant emergency and contingency procedures, which are defined in the OM and are peculiar to flight over known populated areas or over assemblies of people in a given area of operation, and should describe the basic conditions for each kind of emergency as well as the related recovery techniques to be applied during flight for the emergencies that are defined in the OM. Depending on the criticality of the situation and on the available time to react, the remote pilot should memorise some procedures, while for other procedures, they may consult a checklist.

For the practical skill training, the remote pilot only needs to complete the relevant operation-specific endorsement modules that reflect the intended UAS operation. For example, in case of transport of cargo, the remote pilot should complete the related training module 'Transport and/or dropping of cargo'; however, if that cargo contains dangerous goods, then the remote pilot should also complete the training module 'Transport of dangerous goods'.

The assurance level of the operation-specific endorsement modules is determined by the related SAIL according to the respective specific operational risk assessment (SORA).

Relevant UAS operation-specific endorsements modules should be reflected in the documentation of the remote pilot's competencies.

The following UAS operation-specific endorsement modules and the areas to be covered are recommended:

(a) night operations;

(b) overflight (flight over known populated areas or over assemblies of people in a given area of operation that is located in urban environment);

(c) BVLOS operations;

(d) low-altitude (below 500 ft) controlled airspace (LACA);

(e) non-segregated flight;

(f) transport and/or dropping of cargo;

(g) transport of dangerous goods;

(h) operations with multiple UASs and UAS swarms;

(i) UA launch and recovery using special equipment;

(j) flying over mountainous terrain.

Note: The 'Rationale' in grey-font italics under the 'Learning objectives' column is provided for explanatory purposes and does not form part of the proposed rule text.

Operation-specific endorsement modules	**Areas to be covered**	**Learning objectives**
Night operations	General	Recognise the meaning of the definition of 'night' or other similar wording that is used for night flight. *Rationale: In Regulation (EU) No 1178/2011 (the 'Aircrew Regulation'), 'night' for manned aviation 'means the period between the end of evening civil twilight and the beginning of morning civil twilight or such other period between sunset and sunrise as may be prescribed by the appropriate authority'.* *Some national laws use the sunset and sunrise times for the definition of a night flight. 'Sunset' is defined as the daily disappearance of the upper limb of the sun below the horizon. This time depends on the latitude and longitude of the viewpoint. There are many websites and apps to find out the sunset and sunrise times at a specific location.* Recognise the benefits of illuminating the operational area, especially during the critical phases of take-off and landing. Recognise that during the night flight, it is hard to estimate the distances between UA and other obstacles if visibility is only ensured by the lights of the UA. Understand that if the sight of the UA is lost at night, return to home (RTH) should be immediately used. *Rationale: During daytime, it is sometimes difficult to see the position of the UA, which is even more difficult at night.*

Operation-specific endorsement modules	Areas to be covered	Learning objectives
		Recognise that an infrared radiation (IR) camera allows one to see enough at night. Turning off the front green flashing lights might improve the view because there will be no reflection in the on-board camera. Recognise that the IR camera does not help in case of rain/humidity, and that IR visibility significantly decreases. Explain the use of the green flashing light at night. Explain the use of navigation lights, position lights, anti-collision lights, and other lights for UA controllability. Explain the use of lights (e.g. navigation, position, or anti-collision lights) for recognising the presence of manned aircraft. *Rationale: Those lights show how the UA is positioned and in which direction the UA is aligned.* *For manned aircraft, a red navigation light is located on the leading edge of the left wing tip and a green navigation light on the leading edge of the right wing tip (for helicopters, on the left and right sides of the cockpit). A white navigation light is positioned on the tail as far aft as possible. High-intensity strobe lights are also located in those positions. They are used as anti-collision lights and flash twice after a short break. A red rotating beacon is also part of the anti-collision lights.*
	Degradation of visual acuity	Recognise that flying the UA at night degrades visual perception. Recognise night myopia, caused by the increasing pupil size. At low-light levels, without distant objects to focus on, the focusing mechanism of the eye may go to a resting myopic position. If night-vision goggles are used, know how they function.
	Night illusions	Define the term ‘night illusion’. Recognise and overcome visual illusions that are caused by darkness, and understand the physiological conditions that may degrade night vision. State the limitations of night vision techniques at night and by day.

Operation-specific endorsement modules	Areas to be covered	Learning objectives
	Altered visual-scanning techniques	State the limitations of the different visual-scanning techniques at night and by day. *Rationale: Despite the value of electronic means of conflict detection, physical lookout remains an important defence against the loss of visual separation for all types of aircraft.* *To avoid collisions, the remote pilot should visually scan effectively from the moment the UA starts moving until it comes to a stop at the end of the flight. Collision threats are present everywhere.* *Before take-off, the remote pilot should visually check the take-off area to ensure that there are no other objects. After take-off, the remote pilot should continue to visually scan to ensure a safe departure of the UA with no obstacles.*
	Altered identification of obstacles	Explain the effect of obstacles on the take-off distance that is required at night. *Rationale: The remote pilot should know the flight area where the UA will fly at night. Objects look different and power lines are nearly invisible at night. It is, therefore, advisable that the remote pilot conduct a test flight during the daytime.*
Overflight (flight over known populated areas or over assemblies of people in a given area of operation that is located in urban environment)	Optimising flight paths to reduce risk of exposure	Explain the effects of the following variables on the flight path and take-off distances: — take-off procedure; and — obstacle clearances both laterally and vertically.
	Likely operating sites and alternative sites	Recognise the different operating sites and alternative sites on the route of the overflight.
	Adequate clearance for wind effects, especially in urban environment	Explain how the wind changes at very low height due to its interaction with orography and buildings.
	Obstructions (wires, masts, buildings, etc.)	Explain the effect of obstacles on the required take-off distance. Interpret all available procedures, data, and information regarding obstructions that could be encountered during overflight.
	Avoiding third-party interference with the UA	Explain how to avoid third-party interference with the UA.

Operation-specific endorsement modules	Areas to be covered	Learning objectives
	Minimum separation distances from persons, vessels, vehicles, and structures	Explain the importance of minimum separation distances from persons, vessels, vehicles, and structures.
	Command-and-control (C2) electromagnetic interference, i.e. high-intensity radio transmissions	Describe the physical phenomenon 'interference'. Explain in which situations C2 electromagnetic interference could occur, particularly with regard to electromagnetic emissions and signal reflections peculiar to an urban environment.
	Crowd control strategies and public access	Explain the importance of ensuring that no one within the take-off and landing area is endangered. Describe the different crowd control strategies. Explain the importance of having knowledge of public access.
	Geographical zones according to Article 15 of the UAS Regulation	List the areas and UAS geographical zones that are considered restricted airspace for the UA flight. List where to find information on the UAS geographical zones. *Rationale: Knowledge of restricted airspace is extremely important for remote pilots, regardless of whether the flight is commercial or for leisure.* *Examples* *Near airports: UA are generally prohibited from flying near airports because of the increased air traffic.* *In an airport environment: UA pose a hazard because they are difficult to see from the perspective of pilots of commercial flights and of manned aircraft in general.* Explain in which case(s) and from whom permission is required to fly in restricted airspace. *Rationale: While UA flight in restricted airspace is strictly regulated on a national level, it is still possible to obtain an authorisation to fly in restricted airspace. As different entities are in charge of the various types of restricted airspace, there is no single procedure to follow to obtain that authorisation.* Explain how to best avoid flying in restricted airspace. *Rationale: It can prove overwhelming to keep track of so many restricted airspace types.* *Remote pilots should be aware of the existence of mobile applications that support interactive maps*

Operation-specific endorsement modules	Areas to be covered	Learning objectives
		where different airspace types are highlighted. These applications identify the areas/zones where UA flight is prohibited, or a flight authorisation is required.
BVLOS operations	Operation planning: airspace, terrain, obstacles, expected air traffic, and restricted areas	Explain the operation planning for BVLOS operations: — check the flying conditions (e.g. geographical zone, NOTAM) and obstacles on the itinerary; — secure the necessary documentation before the BVLOS operation; — know and comply with the local conditions in the area where the BVLOS operation takes place; — ensure communication with the air traffic controller (ATCO), depending on the type of airspace the BVLOS operation is planned to be conducted in; and — plan the BVLOS operation including flight route and response to contingency and emergency events.
	Sensor systems and their limitations	State the limitations of the different sensor systems. *Rationale: UASs that are used for BVLOS operations, such as delivery, mapping, and aerial surveying, should maintain precise positioning to successfully carry out their mission. Environmental features, such as tunnels and urban canyons, can weaken GNSS signals or even cause them to be lost completely. To maintain accuracy in GNSS-denied environments, UA may use real-time kinematic (RTK) capable inertial navigation systems (INSs) that provide information from accelerometers and gyroscopes to accurately estimate position, velocity, heading, and attitude.*
	Cooperative and non-cooperative aircraft (airspace surveillance)	Identify the cooperative and non-cooperative sense-and-avoid (SAA) sensor/system technologies for UA. *Rationale: Cooperative and non-cooperative SAA capabilities are key enablers for UA to safely and routinely access all airspace classes.*
	Roles and responsibilities of the remote pilot to remain clear of collision	Explain the traffic alert system and traffic collision avoidance system (TCAS) phraseologies, and how these systems work. Identify the roles and responsibilities of the remote pilot to remain clear of collision.

Operation-specific endorsement modules	Areas to be covered	Learning objectives
		Explain the collision avoidance methodology that is used in the operation to keep the UA clear of other traffic. *Rationale: Collision avoidance is emerging as a key enabler for UAS operations in civil airspace. The operational and technical challenges of UAS collision avoidance are complicated by the wide variety of UA, of their associated missions, and of their ground control capabilities. Numerous technological solutions for collision avoidance are being explored in the UAS community.*
	Command, control and communication (C3) link performance and limitations	Know the definition of 'C3'. Understand the relation between communications and effective command and control (C2). Understand the basic C3 structure. Understand the use of true and relative motion displays. Understand the problems inherent in C3. *Rationale: C3 cannot be accomplished without two-way communications. C3 would be impossible unless the remote pilot can collect feedback in some form. Basic to any C3 system is the incorporation of a reliable communications network.*
	Signal or communications latency for the C2 link	Understand the impact of signal or communications latency on the C2 link. Explain what can cause, and how to detect, a signal or communications latency. Describe the actions that are required following a signal or communications latency. *Rationale: BVLOS control may require a satellite communications link that implies a level of signal delay, or signal latency, which may impact on the accuracy of the BVLOS operation.*
	Planning for the loss of signal or for system failure	Understand the impact of a loss of signal. Explain what can cause, and how to detect, a system failure. Describe the actions that are required following a loss of signal. Describe how to plan the contingency routes in case of a loss of the C2 link. *Rationale: It is of utmost importance to keep track of the UASs in civil airspace, and to know what happens if the C2 link between the remote pilot's ground control station and the UAS is disrupted. In such a*

Operation-specific endorsement modules	Areas to be covered	Learning objectives
		loss-of-link situation, the UA usually flies on a preprogrammed contingency route based on its flight altitude, orientation, and bearing. The absence of situational awareness and direct communication from the UA makes it difficult or impossible for the ATCOs to discover where the aircraft is going and to clear the traffic along its intended route.
	Interpreting separate data sources	Interpret different data sources to identify whether during flight the UA follows the planned route.
	Crew resource management (CRM)	Explain the importance of CRM for BVLOS operations.
Low-altitude (below 500 ft) controlled airspace (LACA)	Air traffic management (ATM) procedures	Describe the ATM procedures for LACA.
	Radio communications and phraseology	Define the meaning of 'standard words and phrases'. Recognise, describe, and use the correct standard phraseology for each phase of a visual flight rules (VFR) flight. Explain the selective calling (SelCal) system and aircraft communications addressing and reporting system (ACARS) phraseologies. Explain the traffic alert and collision avoidance system (TCAS) phraseologies.
	Advanced aviation terminology	Explain the meaning of LACA-related terminology.
Non-segregated flight	Clear roles and responsibilities	Describe the relationship between the initiating causes (or threats), the hazard (top (main) event), the risk mitigations (the controls and barriers), and the potential consequential results (loss states) when conducting a non-segregated flight.
	Wake turbulence	State the wake turbulence categories for UA. State the wake turbulence separation minima.
Transport and/or dropping of cargo	Weight and balance	Describe the relationship between UA mass and structural stress. Describe why mass should be limited to ensure adequate margins of strength. Describe the relationship between UA mass and aircraft performance. Describe why UA mass should be limited to ensure adequate aircraft performance.

Operation-specific endorsement modules	Areas to be covered	Learning objectives
		Depending on the type of operation, describe the relationship between centre-of-gravity (CG) position and stability/controllability of the UA. Describe the consequences if the CG is in front of the forward limit. Describe the consequences if the CG is behind the aft limit. Describe the relationship between CG position and aircraft performance. Describe the effects of the CG position on the performance parameters (speed, altitude, endurance, and range). Be familiar with the abbreviations regarding mass and balance, e.g. (maximum) take-off mass ((M)TOM), (maximum) landing mass ((M)LM), basic empty mass (BEM), dry operating mass (DOM), operating mass (OM), and zero-fuel mass (ZFM). Describe the effects of changes in the load when dropping an object. Describe the effects of an unintended loss of the load. *Rationale: Mass and balance are extremely important for a UA. A UA that is not in balance may become difficult to control. Therefore, the overall balance should be considered when adding payloads, attaching gimbals, etc.*
	Load securing and awareness of dangerous goods	Calculate the MTOM and MLM. Explain the reasons for restraining or securing cargo loads. Describe the basic methods of restraining or securing loads. Explain why the transport of dangerous goods by air is subject to an additional training module. State that certain articles and substances, which would otherwise be classed as dangerous goods, may be exempted if they are part of the UA equipment. *Rationale: The safe operation of the UAS requires to weigh all cargo in the UA (or provide an accurate estimate of weight using 'standard' values), load it correctly, and secure it to prevent loss or movement of the cargo during the flight.* *Loading should be performed in accordance with the applicable regulations and limitations. The UAS operator's loading procedures should be in accordance with the instructions given by the person*

Operation-specific endorsement modules	Areas to be covered	Learning objectives
		that has the overall responsibility for the loading process for a particular UA flight. These loading instructions should match the requirements for cargo distribution that are included in the UA load and trim sheet.
Transport of dangerous goods		Explain the terminology relevant to dangerous goods. Be able to recognise dangerous goods and understand their labelling. Be able to interpret a Notification to Captain (NOTOC). Recognize dangerous goods by using 'Safety Data Sheets' and the consumer labelling of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). Explain that the provisions for the transport of dangerous goods by air are included in ICAO Doc 9284 'Technical Instructions for the Safe Transport of Dangerous Goods by Air'. State the emergency/reporting procedures in case of an event with dangerous goods, including that in the event of a dangerous-goods-related emergency regarding the UA, the remote pilot should inform the ATC organisation of the transport of dangerous goods. Explain the principles of compatibility and segregation of dangerous goods. Explain the special requirements for loading radioactive materials. Explain the use of the dangerous goods list. Explain the procedures for collecting safety data, e.g. reporting accidents, incidents, and occurrences with dangerous goods.
Operations with multiple UASs and UAS swarms	Limitations related to human factors	Understand the human performance limitations in an operation with multiple UASs or UAS swarms. List the vital actions that the remote pilot and the persons who assist the remote pilot should perform in case of an emergency descent of the multiple/swarming UASs.
	CRM	Explain the importance of CRM for operations with multiple UASs and UAS swarms.
	Navigating multiple platforms	Describe how to navigate multiple platforms.

Operation-specific endorsement modules	Areas to be covered	Learning objectives
	Recognising system failures	Describe the different failures that may potentially occur during multiple/swarming UAS operations. Explain what to do in the event of a failure. Recognise that the remote pilot can override the system in the event of a failure.
	Emergency containment procedures	List the different emergency containment procedures and describe the basic conditions for each kind of emergency. Describe the recovery techniques in the event of engine or battery failure during multiple/swarming UAS operations.
UAS launch and recovery using special equipment	Operating procedures	Explain the specific procedures for launch and recovery operations. Explain the impact on the UA's behaviour when the systems for launch and recovery are operated from a vehicle, including ships.
	Recognising failures	Describe the different failures that may occur during the launch and recovery operations. Explain what to do in the event of a failure. Describe the cases where the remote pilot can override the system in the event of a failure.
Flying over mountainous terrain	Temperature inversions	Describe the following: — the effect of temperature near the Earth's surface, — surface effects, — diurnal and seasonal variations, — the effect of clouds, and — the effect of wind. *Rationale: The temperature can affect the density altitude. If the UA flies on a hot and humid day, the remote pilot will experience poor UA performance: as the temperature increases, the air molecules spread out. As a result, the propellers or motors of the UA do not have much air to grab on to.*
	Orographic lifting	Describe the effect of exploiting orographic lifting (i.e. slope or ridge) and the actions required. Describe the vertical movements, wind shear, and turbulence, which are typical of mountainous areas. *Rationale: Orographic lifting occurs when an air mass is forced from a low elevation to a higher elevation as it moves over rising terrain. As the air*

Operation-specific endorsement modules	Areas to be covered	Learning objectives
		mass gains altitude, it quickly cools down adiabatically, which can raise the relative humidity to 100 %, create clouds and, under the right conditions, cause precipitation[52].
	Higher winds through passes	Describe the effects of wind shear and the actions required when wind shear is encountered at take-off and approach. Describe the precautions to be taken when wind shear is suspected at take-off and approach. Describe the effects of wind shear and the actions required following entry into strong downdraught wind shear. Describe the influence of a mountainous area on a frontal passage. *Rationale: In mountainous environment, the wind blows smoothly on the windward side of the mountain. On the leeward side, the wind follows the contours of the terrain and can be quite turbulent: this is called a katabatic wind. The stronger the wind, the higher the downward pressure. Such a wind will push the UA down towards the surface of the mountain. If the remote pilot does not know how to recognise a downdraft, which is downward moving air, the situation can become quite challenging.*
	Mountain waves	Explain the origin and formation of mountain waves. State the conditions necessary for the formation of mountain waves. Describe the structure and properties of mountain waves. Explain how mountain waves may be identified through their associated meteorological phenomena. Explain that mountain wave effects may exceed the performance or structural capability of the UA. Explain that mountain wave effects may be propagated from low to high levels. Indicate the turbulent zones (mountain waves, rotors) on a drawing of a mountain chain.
	High- and low-pressure patterns	Describe the movements of fronts and pressure systems, and the life cycle of a midlatitude depression.

52 https://en.wikipedia.org/wiki/Orographic_lift

Operation-specific endorsement modules	Areas to be covered	Learning objectives
		State the rules for predicting the direction and the speed of movement of fronts. State the difference in the speed of cold and warm fronts. State the rules for predicting the direction and the speed of frontal depressions.
	Density altitude effects	Define pressure altitude and air density altitude. Explain the effects of all-up mass (AUM), pressure, temperature, density altitude, and humidity. Explain the influence of density altitude on the equilibrium of forces and moments in a stable hover, if applicable. *Rationale: Higher-density altitude means thinner air, and thinner air means that the remote pilot will experience poor UA performance. The propellers or motors of the UA do not have much air to grab on to. Lower-density altitude means thicker, denser air, and higher UA performance.* *This knowledge is very important when the remote pilot flies in a mountainous or other high-elevation environment.*

~~AMC1 UAS.SPEC.050(1)(e)(ii) Responsibilities of the UAS operator~~

~~**INFORMATION ABOUT THE UAS OPERATOR'S MANUAL**~~

~~The UAS operator should ensure that the personnel in charge of duties essential to the UAS operation apply the procedures contained in the operator's manual.~~

GM1 UAS.SPEC.050(1)(d)(iii) Responsibilities of the UAS operator

COORDINATION WITH THE DESIGNATED ENTITY(IES)

For UAS operations that require an operational authorisation, the training of the remote pilots must be conducted in coordination with the entity(ies) that is (are) designated by the competent authority, only if the competent authority has nominated entities that meet the applicable criteria to provide the required training. If the competent authority has not designated any entity, then such coordination is not required.

GM~~2~~1 UAS.LUC.030(2)(g)(vi) Safety management system

GM~~2~~1 UAS.LUC.030(2)(g)(viii) Safety management system

AMC1 UAS.LUC.030(2)(g)(v) Safety management system

COMPLIANCE MONITORING

[…]

(b) The compliance monitoring manager should:

[…]

(3) not be one of the other persons referred to in UAS.LUC.030(2)(~~c~~d).

AMC1 UAS.LUC.030(2)(g)(vi) Safety management system

SAFETY RISK MANAGEMENT

[…]

(h) respond to emergencies using an ERP that reflects the size, nature, and complexity of the activities performed by the organisation, considering AMC3 UAS.SPEC.030(3)(e). The ERP should:

(1) contain the action to be taken by the UAS operator or specified individuals in an emergency;

(2) provide for a safe transition from normal to emergency operations and vice versa;

(3) ensure coordination with the ERPs of other organisations, where appropriate; and

(4) describe emergency training/drills, as appropriate.

AMC~~2~~1 UAS.LUC.040 LUC manual

GENERAL

The LUC manual may contain references to the OM, where an OM is compiled in accordance with ~~GM~~AMC1 UAS.SPEC.030(3)(e).

[…]

LUC MANUAL TEMPLATE

Operator's name

Table of contents

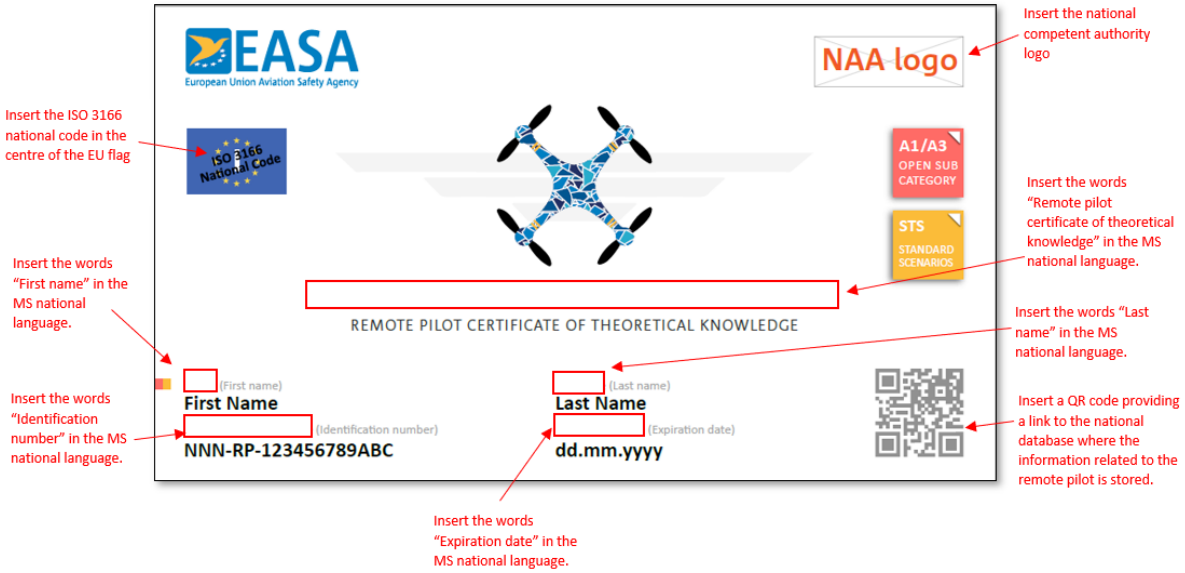
1. Introduction (*the information under Chapter 1~~0, points 1-6~~ of the OM may be duplicated here or simply referenced to the OM*)

[…]

AMC1 UAS.STS-01.020(1)(e)(i) UAS operations in STS-01 and UAS.STS-02.020(7)(a) UAS operations in STS-02

CERTIFICATE OF REMOTE PILOT THEORETICAL KNOWLEDGE

Upon receipt of proof that the remote pilot has successfully completed the theoretical knowledge examination, the competent authority or the entity that is designated by the competent authority should provide the remote pilot with a certificate of remote pilot theoretical knowledge in the format that is depicted in the figure below. The certificate may be provided in electronic form.



The identification number that is provided by the competent authority, or the entity that is designated by the competent authority, which issues the certificate of remote pilot theoretical knowledge should have the following format:

NNN-RP-xxxxxxxxxxx

Where:

— 'NNN' is the ISO 3166 Alpha-3 code of the competent authority that issues the proof of completion;

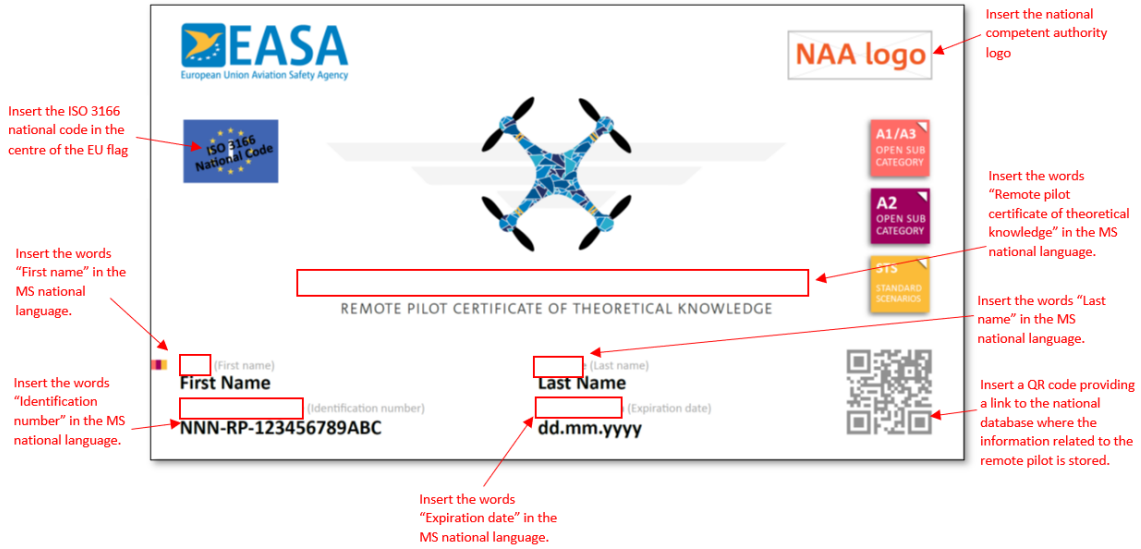
— 'RP' is a fixed field meaning 'remote pilot'; and

— 'xxxxxxxxxxx' are 12 alphanumeric characters (lower-case only) defined by the competent authority that issues the proof of completion.

Example: (FIN-RP-123456789abc)

Through the quick response (QR) code that links to the 'remote pilot number', all information related to the training of the remote pilot can be retrieved by authorised bodies (e.g. competent authorities, law enforcement authorities, etc.) and authorised personnel.

If the remote pilot, before passing the theoretical knowledge examination, provides the declaration of the practical skill self-training as defined in point UAS.OPEN.030(2)(c), the competent authority may include in the certificate also 'subcategory A2'.



AMC1 UAS.STS-01.020(1)(e)(ii) UAS operations in STS-01 and UAS.STS-02.020(7)(b) UAS operations in STS-02

REMOTE PILOT PRACTICAL TRAINING FOR STSs

The instructor should gradually compile a 'progress booklet' to allow for the monitoring of the training and the continuous evaluation of the practical skills of the student remote pilot.

The progress booklet should be signed by the student remote pilot at the end of each practical training cycle. A record of the booklet should be kept for 5 years.

When the student remote pilot reaches the desired level of competence, the organisation that provides the practical training issues an attestation of practical training.

GM1 UAS.STS-01.020(1)(e)(ii) UAS operations in STS-01 and UAS.STS-02.020(7)(b) UAS operations in STS-02

REMOTE PILOT PRACTICAL TRAINING FOR STSs

Practical training for STSs is provided as a 'continuous evaluation' of the student remote pilot by:

(1) either a UAS operator that has declared compliance with:

(a) the relevant STS(s) (the one(s) for which training and assessment are provided); and

(b) the requirements of Appendix 3 to the UAS Regulation; or

(2) an entity that has declared compliance with the requirements of Appendix 3 to the UAS Regulation.

GM1 UAS.STS-01.020(1)(c) UAS operations in STS-01

GROUND RISK BUFFER

The values for determining the size of the ground risk buffer that are indicated in the table of point UAS.STS-01.020(1)(c)(i)(C) should be considered as minimum values. However, additional margins should be considered depending on factors that may increase the distance that is travelled by the UA, e.g. UA flight characteristics, such as autorotation capability, wind, remote pilot's reaction time, etc.

AMC1 UAS.STS-01.030(2) and UAS.STS-02.030(2) Responsibilities of the UAS operator

DEFINITION OF THE OPERATIONAL VOLUME

To define the operational volume, the UAS operator should consider the position-keeping capabilities of the UAS in a 4D space (latitude, longitude, height, and time).

The accuracy of the navigation solution, the flight technical error of the UAS, as well as the path definition error (e.g. map error) and latencies should be considered and addressed in defining the operational volume.

AMC1 UAS.STS-01.030(1)&(3) and UAS.STS-02.030(1)&(3) Responsibilities of the UAS operator

OPERATIONAL PROCEDURES

The UAS operator should comply with the conditions for medium level of robustness of AMC2 UAS.SPEC.030(3)(e) as regards:

— the operational procedures contained in the OM, indicated in UAS.STS-01.030(1) and UAS.STS-02.030(1); and

— the adequacy of the contingency and emergency procedures, indicated in UAS.STS-01.030(3) and UAS.STS-02.030(3).

The flight test to verify the adequacy of the contingency and emergency procedures may be conducted in subcategory A3 of the 'open' category. In that case, the UAS operator should ensure that the UAS operation complies with the 'open' category requirements.

AMC1 UAS.STS-01.030(4) and UAS.STS-02.030(4) Responsibilities of the UAS operator

EMERGENCY RESPONSE PLAN (ERP)

The UAS operator should develop an ERP in compliance with the conditions for medium level of robustness of AMC3 UAS.SPEC.030(3)(e).

GM1 UAS.STS-01.030(5)&(6) and UAS.STS-02.030(5)&(6) Responsibilities of the UAS operator

EXTERNAL SERVICES

External service should be understood as any service that is provided to the UAS operator, which:

— is necessary to ensure the safety of a UAS operation; and

— is provided by a service provider other than the UAS operator[53].

AMC1 UAS.STS-02.020(3) UAS operations in STS-02

FLIGHT VISIBILITY

Point UAS.STS-02.020(3) requires a minimum flight visibility of 5 km to ensure that the remote pilot and/or the AO(s) can adequately scan the operational volume and surrounding airspace to detect well in advance any incoming aircraft and identify any risk of collision with that aircraft.

Flight visibility should be understood as the average distance from the remote pilot's position, or from the position of each of the AOs (if employed), at which unlighted objects may be seen and identified at day and prominently lighted objects may be seen and identified at night.

Before starting the intended UAS operation, the UAS operator should gather all relevant information that may affect the UAS flight visibility.

Other aspects that should be considered are, for example, the light conditions (including the sun or other intense lights that may blind the remote pilot and/or the AO(s)), the presence of natural or artificial obstacles, the presence of smoke, etc.

AMC1 Appendix 2 Operational declaration

OPERATIONAL DECLARATION FORM: UAS MANUFACTURER, UAS MODEL AND UAS SERIAL NUMBER

If the UAS operator intends to conduct UAS operations that are covered by the STS that uses different UASs (not used at the same time in the same location and all bearing the appropriate class identification label), the UAS operator is not required to submit a separate operational declaration form for each individual UAS.

In such a case, the information on 'UAS manufacturer', 'UAS model', and 'UAS serial number' for each individual UAS should be provided in the corresponding fields of the operational declaration form in the same order and separated by a comma ',' or a semicolon ';'. For example, for two different individual UASs from different manufacturers:

[53] For examples of such service providers, see the footnote in E.6 'OSOs related to the deterioration of external systems supporting UAS operations' of Annex E to AMC1 Article 11 of the UAS Regulation.

UAS manufacturer	UAS manufacturer #1, UAS manufacturer #2
UAS model	UAS model #1, UAS model #2
UAS serial number	UAS serial number #1, UAS serial number #2

If the UAS operator intends to provide practical skill training and conduct practical skill assessments of remote pilots that operate in an STS, information on the manufacturer, the model, and the serial number of the UAS that is used for such training and assessment should also be included in the operational declaration form even if the UAS is used only for training and assessment purposes.

4. Impact assessment (IA)

No impact assessment is carried out for this NPA since it mostly contains improvements to published AMC and GM and lessons learned from the application of the UAS Regulation by UAS operators and the EASA Member States.

The objective of this proposal is to provide procedures and guidance to foster the harmonised application of the UAS Regulation and a uniform level of safety across the EASA Member States.

No new controversial subjects are contained in this proposal.

5. Proposed actions to support implementation

— Focused communication for Advisory Body meeting(s) (MAB/SAB/TeB/TEC/COM)

— Clarifications via electronic communication tools between EASA and national aviation authorities (NAAs) (EUSurvey or other)

— Detailed explanations/clarifications on the EASA website for industry and competent authorities

— Dedicated thematic workshops/sessions/webinars for industry and competent authorities

— Combination of the above-mentioned means

6. References

6.1. Related regulations

— Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft (OJ L 152, 11.6.2019, p. 45)

— Commission Implementing Regulation (EU) 2020/639 of 12 May 2020 amending Implementing Regulation (EU) 2019/947 as regards standard scenarios for operations executed in or beyond the visual line of sight Commission Implementing Regulation (EU) 2020/639 of 12 May 2020 amending Implementing Regulation (EU) 2019/947 as regards standard scenarios for operations executed in or beyond the visual line of sight (OJ L 150, 13.5.2020, p. 1)

— Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems (OJ L 152, 11.6.2019, p. 1)

6.2. Related decision

— Executive Director Decision 2019/021/R of 9 October 2019 issuing Acceptable Means of Compliance and Guidance Material to Commission Implementing Regulation (EU) No 2019/947 'Rules and procedures for the operation of unmanned aircraft'

6.3. Other reference documents

n/a

7. Appendix

Overview of the competency subjects for the different subcategories of the 'open' and the 'specific' category

THEORETICAL KNOWLEDGE TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2, and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
	Sources: — UAS.OPEN.020(4)(b); — UAS.OPEN.030(2)(a); and — UAS.OPEN.040(3). Elements in: — AMC1 UAS.OPEN.020(4)(b) and UAS.OPEN.040(3) 'UAS operations in subcategories A1 and A3'.	Same as for A1, A2 and A3.	Sources: — UAS.SPEC.050(1)(d) and — UAS.STS-01.020, point (2). Elements in: — CHAPTER I — STS-01: — Attachment A: REMOTE PILOT THEORETICAL KNOWLEDGE AND PRACTICAL SKILL EXAMINATION FOR STS-01; and — CHAPTER II — STS-02: — Attachment A: REMOTE PILOT THEORETICAL KNOWLEDGE AND PRACTICAL SKILL FOR STS-02.	Sources: — UAS.SPEC.050(1)(d); and — Annex E to AMC1 to Article 11 (SORA), point E.4. Elements in: — AMC1 UAS.SPEC.050(1)(d) 'Responsibilities of the UAS operator'.
Air safety	(1) Non-reckless behaviour, safety precautions for UAS operations	Same as for A1, A2, and A3.	Same as for A1, A2, and A3.	Same as for A1, A2 and A3, complemented by:

THEORETICAL KNOWLEDGE TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2, and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
	and basic requirements regarding dangerous goods; (2) starting or stopping the operations taking into account environmental factors, UAS conditions and limitations, remote pilot limitations and human factors; (3) operation in visual line of sight (VLOS), which entails: (i) keeping a safe distance from people, animals, property, vehicles, and other airspace users; (ii) the identification of assemblies of people; (iii) a code of conduct in case the UA encounters other traffic; (iv) respecting the height limitation; and (v) when using a UA observer, the responsibilities and communication between the UA observer and the remote pilot; and			(1) remote pilot records; (2) logbooks and associated documentation; (3) good airmanship principles; (4) aeronautical decision-making; (5) aviation safety; (6) air proximity reporting; and (7) advanced airmanship: (i) manoeuvres and emergency procedures; and (ii) general information on unusual conditions (e.g. stalls, spins, vertical-lift limitations, autorotation, vortex ring states.

THEORETICAL KNOWLEDGE TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2, and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
	(4) familiarisation with the operating environment, in particular: (i) how to perform the evaluations of the presence of uninvolved person in the overflown area as required in UAS.OPEN.020(1) and UAS.OPEN.040(1); and (ii) informing the people involved.			
Airspace restrictions	Obtain and observe updated information about any flight restrictions or conditions published by the MS according to Article 15 of the UAS Regulation.	Same as for A1, A2, and A3.	Same as for A1, A2, and A3.	Same as for A1, A2, and A3.
Aviation regulations	(1) Introduction to EASA and the aviation system; (2) Regulation (EU) 2019/945 and Regulation (EU) 2019/947: (i) their applicability to EU MSs; (ii) subcategories in the 'open' category and the associated classes of UAS;	Same as for A1, A2, and A3.	Same as for A1, A2, and A3.	Same as for A1, A2, and A3, complemented by: (1) introduction to the 'specific' category; (2) risk assessment, introduction to SORA; and (3) overview of STSs and PDRAs.

THEORETICAL KNOWLEDGE TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2, and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
	(iii) registration of UAS operators; (iv) the responsibilities of the UAS operator; (v) the responsibilities of the remote pilot; and (vi) incident-accident reporting.			
Human performance limitations	(1) The influence of psychoactive substances or alcohol or when the remote pilot is unfit to perform their tasks due to injury, fatigue, medication, sickness, or other causes; (2) human perception: (i) factors influencing VLOS; (ii) the distance of obstacles and the distance between the UA and obstacles; (iii) evaluation of the speed of the UA; (iv) evaluation of the height of the UA;	Same as for A1, A2, and A3.	Same as for A1, A2, and A3.	Same as for A1, A2, and A3, complemented by: (1) perception (situational awareness in BVLOS operations); (2) fatigue: (i) flight durations within work hours; (ii) circadian rhythms; (iii) work stress; and (iv) commercial pressures; (3) attentiveness: (i) eliminating distractions; (ii) scan techniques;

THEORETICAL KNOWLEDGE TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2, and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
	(v) situational awareness; and (vi) night operations.			(iv) medical fitness (health precautions, alcohol, drugs, medication etc.); and (v) environmental factors such as vision changes from orientation to the sun.
Operational procedures	(1) Pre-flight: (i) assessment of the area of operation and the surrounding area, including the terrain and potential obstacles and obstructions for keeping VLOS of the UA, potential overflight of uninvolved persons, and the potential overflight of critical infrastructure; (ii) identification of a safe area where the remote pilot can perform a practice flight; (iii) environmental and weather conditions (e.g. factors that can affect the performance of the UAS such as electromagnetic	Same as for A1, A2, and A3.	Same as for A1, A2, and A3.	Same as for A1, A2, and A3, complemented by: (1) mission planning, airspace considerations, and site risk assessment: (i) measures to comply with the limitations and conditions applicable to the operational volume and the ground risk buffer for the intended operation; (ii) operations over a controlled ground area; and (iii) BVLOS operations; use of UA AOs; (2) multi crew cooperation (MCC): (i) coordination between the remote pilot and other

THEORETICAL KNOWLEDGE TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2, and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
	interference, wind, temperature, etc.); methods of obtaining weather forecasts; and (iv) checking the conditions of the UAS; (2) In-flight: (i) normal procedures; and (ii) contingency procedures for abnormal situations (e.g. for lost-data-link connections); (3) Post-flight: (i) maintenance; and (ii) logging of flight details.			personnel in charge of duties essential to the UAS operation (i.e. AO); (iii) crew resource management (CRM): (A) effective leadership; and (B) working with others.
UAS general knowledge	(1) Basic principles of flight; (2) the effect of environmental conditions on the performance of the UAS; (3) principles of command and control: (i) overview;	Same as for A1, A2, and A3.	Same as for A1, A2, and A3.	Same as for A1, A2, and A3, complemented by: (1) loss of signal and system failure protocols — understanding the condition and planning for programmed responses, such as returning to home, loiter, landing immediately;

THEORETICAL KNOWLEDGE TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2, and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
	(ii) data link frequencies and spectrums; and (iii) automatic flight modes, override, and manual intervention; (4) familiarisation with the instructions provided by the user's manual of a UAS, in particular with regard to: (i) having an overview of the main elements of the UAS; (ii) knowing the limitations (e.g. mass, speed, environmental, duration of battery, etc.); (iii) controlling the UAS in all phases of flights (e.g. the take-off, hovering in mid-air, when applicable, flying basic patterns, and landing); (iv) knowing the features that affect the safety of flight; (v) setting the parameters of the lost-link procedures;			(2) flight termination systems; and (3) flight control modes; (4) the means to monitor the UA (its position, height, speed, C2 Link, systems status, etc.); (5) the means of communication with AOs; and (6) the means to support air traffic awareness.

THEORETICAL KNOWLEDGE TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2, and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
	(vi) setting the maximum height; (vii) knowing the procedures to load geographical zone data into the geo-awareness system; (viii) knowing the procedures to load the UAS operator registration number into the direct remote identification system; (ix) safety considerations: (A) instructions to secure the payload; (B) precautions to avoid injuries from rotors and sharp edges; and (C) safe handling of batteries; (x) maintenance instructions.			
Privacy and data protection	(1) understanding the risk posed to privacy and data protection; and (2) the guiding principles for data protection under the GDPR.	Same as for A1, A2, and A3.	Same as for A1, A2, and A3.	Same as for A1, A2, and A3.

THEORETICAL KNOWLEDGE TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2, and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
Insurance	(1) Liability in case of an accident or incident; (2) general knowledge of the EU regulations; and (3) awareness of the possible different national requirements for insurance in the MSs.	Same as for A1, A2, and A3.	Same as for A1, A2, and A3.	Same as for A1, A2, and A3.
Security	(1) An understanding of the security risks; (2) an overview of the EU regulations; and (3) awareness of the possible different national requirements for security in the MSs.	Same as for A1, A2, and A3.	Same as for A1, A2, and A3.	Same as for A1, A2, and A3.
Meteorology	n/a	(1) The effect of weather on the UA: (i) wind (e.g. urban effects, turbulence); (ii) temperature; (iii) visibility; and (iv) the density of the air; and	Same as for A2.	Same as for A2, complemented by: (1) obtaining and interpreting advanced weather information: (i) weather-reporting resources; (ii) reports;

THEORETICAL KNOWLEDGE TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2, and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
		(2) obtaining weather forecasts.		(iii) forecasts and meteorological conventions appropriate for typical UAS flight operations; (iv) local weather assessments; (v) low-level charts; and (vi) METAR, SPECI, TAF; (2) regional weather effects — standard weather patterns in coastal, mountainous, or desert terrains; and (3) weather effects on the UA (wind, storms, mist, variation of wind with altitude, wind shear etc.).
UAS flight performance	n/a	(1) The typical operational envelope of a rotorcraft, for fixed-wing and hybrid configurations; (2) mass and balance, and centre of gravity (CG): (i) consider the overall balance when attaching gimbals, payloads; (ii) understand that payloads can have different	Same as for A2.	Same as for A2.

THEORETICAL KNOWLEDGE TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2, and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
		characteristics, thus making a difference to the stability of a flight; and (iii) understand that each different type of UA has a different CG; (3) secure the payload; and (4) batteries: (i) understand the power source to help prevent potential unsafe conditions; (ii) familiarise oneself with the existing different kinds of battery types; (iii) understand the terminology that is used for batteries (e.g. memory effect, capacity, c-rate); and (iv) understand how a battery functions (e.g. charging, usage, danger, storage).		

THEORETICAL KNOWLEDGE TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2, and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
Technical and operational mitigation measures for ground risk	n/a	(1) Low-speed mode functions; (2) evaluating the distance from people; and (3) the 1:1 rule.	Same as for A2.	Same as for A1, A2, and A3.
Technical and operational mitigation measures for air risk	n/a	n/a	(1) Principles of EVLOS by employing an AO; and (2) principles of detect and avoid (DAA).	As in STSs.
Airspace operating principles	n/a	n/a	n/a	(1) Airspace classifications and operating principles; (2) U-space; (3) procedures for airspace reservation; (4) aeronautical information publications; and (5) NOTAM.
Navigation	n/a	n/a	n/a	(1) Navigational aids and their limitations (e.g. GNSS) (2) reading maps and aeronautical charts (e.g. 1:500 000 and 1:250 000, interpretation,

THEORETICAL KNOWLEDGE TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2, and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
				specialised charts, helicopter routes, U-space service areas, and understanding of basic terms); and (3) vertical navigation (e.g. reference altitudes and heights, altimetry).
Managing data sources regarding:	n/a	n/a	n/a	(1) where to obtain the data from; (2) the security of the data; (3) the quantity of the data needed; and (4) the impact on the storage of data.
ERP	n/a	n/a	n/a	Competency-based training covering the ERP that includes the related proficiency requirements and recurrent training.

PRACTICAL SKILL TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2 and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
	No practical skill training	Practical skill self-training Sources: — UAS.OPEN.030(2)(b); — AMC1 UAS.OPEN.030(2)(b) 'UAS operations in subcategory A2'; and — AMC2 UAS.OPEN.030(2)(b) 'UAS operations in subcategory A2'.	Continuous practical skill training Sources: — UAS.STS-01.020; — Attachment A: REMOTE PILOT THEORETICAL KNOWLEDGE AND PRACTICAL SKILL EXAMINATIONS FOR STS-01 (UAS operations in VLOS over a controlled ground area in a populated environment); and — Attachment A: REMOTE PILOT THEORETICAL KNOWLEDGE AND PRACTICAL SKILL FOR STS-02 (BVLOS UAS operations with AOs over a controlled ground area in a sparsely populated environment), point (2).	Practical skill training Sources: — UAS.SPEC.050(d). Elements in: — AMC2 UAS.SPEC.050(1)(d) and UAS.SPEC.050(1)(e) 'Responsibilities of the UAS operator'.
Preparation of the UAS operation		(1) Make sure that the: (i) chosen payload is compatible with the UAS used for the UAS operation; (ii) zone of UAS operation is suitable for the intended operation; and (iii) UAS meets the technical requirements of the geographical zone;	(1) Operation planning, airspace considerations, and site risk assessment. The following points are to be included: (i) identify the objectives of the intended operation; (ii) make sure that the defined operational volume and relevant buffers (e.g. ground risk buffer)	Same as A2 plus the following: (1) implement the necessary measures to comply with the limitations and conditions applicable to the operational volume and ground risk buffer for the intended operation in accordance with the operations manual procedures;

PRACTICAL SKILL TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2 and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
		(2) define the area of operation in which the intended operation takes place in accordance with UAS.OPEN.040; (3) define the area of operation considering the characteristics of the UAS; (4) identify the limitations published by the MS for the geographical zone (e.g. no-fly zones, restricted zones, and zones with specific conditions near the operation zone), and if needed, seek authorisation by the entity responsible for such zones; (5) identify the goals of the UAS operation; (6) identify any obstacles and the potential presence of uninvolved persons in the area of operation that could hinder the intended UAS operation; and (7) check the current meteorological conditions and the forecast for the time planned for the operation.	are suitable for the intended operation; (iii) spot the obstacles in the operational volume that could hinder the intended operation; (iv) identify whether the wind speed and/or direction may be affected by topography or by obstacles in the operational volume; (v) select relevant data on airspace information (including on UAS geographical zones) that can have an impact on the intended operation; (vi) make sure the UAS is suitable for the intended operation; (vii) make sure that the selected payload is compatible with the UAS used for the operation; (viii) implement the necessary measures to comply with the limitations and conditions applicable to the operational volume and ground risk buffer for the intended operation in	(2) Implement the necessary procedures to operate in controlled airspace, including a protocol to communicate with ATC and obtain clearance and instructions, if necessary; (3) confirm that all the necessary documents for the intended operation are on site; (4) brief all participants about the planned operation. (5) perform airspace scanning; and (6) if AOs are employed: ensure adequate placement of AOs, and provide a deconfliction scheme that includes phraseology, coordination, and communications means.

PRACTICAL SKILL TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2 and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
			accordance with the OM procedures for the relevant scenario; (ix) implement the necessary procedures to operate in controlled airspace, including a protocol to communicate with ATC and obtain clearance and instructions, if necessary; (x) confirm that all the necessary documents for the intended operation are on site; and (xi) brief all participants about the planned operation. (2) Only for STS-02: (i) airspace scanning; and (ii) operations with AOs: adequate placement of AOs, and a deconfliction scheme that includes phraseology, coordination, and communications means.	
Preparation for the flight		(1) Assess the general condition of the UAS and ensure that the configuration of the	(1) UAS pre-flight inspection and set-up (including flight modes and power	Same as for A2, complemented by:

PRACTICAL SKILL TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2 and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
		UAS complies with the instructions provided by the manufacturer in the user's manual; (2) ensure that all removable components of the UA are properly secured; (3) make sure that the software installed on the UAS and on the remote pilot station (RPS) is the latest published by the UAS manufacturer; (4) calibrate the instruments on board the UA, if needed; (5) identify possible conditions that may jeopardise the intended UAS operation; (6) check the status of the battery and make sure it is compatible with the intended UAS operation; (7) activate the geo-awareness system and ensure that the geographical information is up to date; (8) set the height limitation system, if needed; (9) set the low-speed mode; and	source hazards). The following points are to be included: (i) assess the general condition of the UAS; (ii) ensure that all the removable components of the UAS are properly secured; (iii) make sure that the UAS software configurations are compatible; (iv) calibrate the instruments in the UAS; (v) identify any flaw that may jeopardise the intended operation; (vi) make sure that the energy level of the battery is sufficient for the intended operation; (vii) make sure that the flight termination system of the UAS and its triggering system are operational; (viii) check the correct functioning of the command and control link;	(1) ensuring that all the safety elements available on the UAS, including the height and speed limitation systems, the flight termination system, and its triggering system are operational; and (2) knowledge of the basic actions to be taken in the event of an emergency situation, including issues with the UAS, or if a mid-air collision hazard arises during the flight.

PRACTICAL SKILL TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2 and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
		(10) check the correct functioning of the C2 link.	(ix) activate the geo-awareness function and upload the information to it (if geo-awareness function is available); and (x) set the height and speed limitation systems (if available). (2) Knowledge of the basic actions to be taken in the event of an emergency situation, including issues with the UAS, or if a mid-air collision hazard arises during the flight.	
Flight under normal conditions		(1) Using the procedures provided by the manufacturer in the user's manual, familiarise oneself with how to: (i) take off (or launch); (ii) make a stable flight; (iii) keep the UA outside of no-fly zones or restricted zones, unless holding an authorisation; (iv) use external references to assess the distance and height of the UA;	(1) Maintain an effective look-out and keep the UA within VLOS at all times, to include: situational awareness of the location in relation to the operational volume and other airspace users, obstacles, terrain, and persons who are not involved at all times (NB: only for STS-02, BVLOS operation should also be considered). (2) Perform accurate and controlled flight manoeuvres at different heights and distances representative of the corresponding STS (including flight in manual/non-GNSS-assisted mode or	

PRACTICAL SKILL TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2 and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
		(v) perform the return-to-home (RTH) procedure — automatic or manual; (vi) land (or recovery); (vii) perform the landing procedure and a missed approach in case of a fixed-wing UA; and (viii) perform real-time monitoring of the status and endurance limitations of the UAS; and (2) maintain sufficient separation from obstacles.	the equivalent, where fitted). At least the following manoeuvres should be performed: (i) hover in position (only for rotorcraft); (ii) transition from hover into forward flight (only for rotorcraft); (iii) climb and descent from level flight; (iv) turns in level flight; (v) speed control in level flight; (vi) actions after a failure of a motor/propulsion system; and (vii) evasive action (manoeuvres) to avoid collisions. (3) Real-time monitoring of the UAS status and endurance limitations.	
Flight under abnormal conditions		(1) Manage the UAS flight path in abnormal situations; (2) manage a situation when the UAS positioning equipment is impaired (if the	(1) Manage a partial or complete power shortage of the UA propulsion system, while ensuring the safety of third parties on the ground;	Same as for A2, complemented by: (1) managing a partial or complete power shortage of the UA propulsion system, while ensuring

PRACTICAL SKILL TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2 and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
		UAS allows the deactivation of such equipment); (3) manage the exit from the operation zone as defined during the flight preparation; (4) select the safeguard mechanism relevant to a situation; (5) resume manual control of the UAS when automatic systems render the situation dangerous; and (6) apply the recovery method following a deliberate (simulated) loss of the C2 link .	(2) manage the path of the UA in abnormal situations; (3) manage a situation in which the UA positioning equipment is impaired; (4) manage a situation of an incursion by a person not involved in the operational volume or the controlled ground area, and take appropriate measures to maintain safety; (5) react to, and take the appropriate corrective actions for a situation where the UA is likely to exceed the limit of the flight geography (contingency procedures) and of the operational volume (emergency procedures) as they were defined during the flight preparation; (6) manage the situation when an aircraft approaches the operational volume; and (7) demonstrate the recovery method following a deliberate (simulated) loss of the C2 link.	the safety of third parties on the ground; (2) managing a situation of an incursion by a person not involved in the operational volume or the controlled ground area, and taking appropriate measures to maintain safety; and (3) reacting to, and taking the appropriate corrective actions for, a situation where the UA is likely to exceed the limit of the flight geography (contingency procedures) and of the operational volume (emergency procedures) as they were defined during the flight preparation.

PRACTICAL SKILL TRAINING				
SUBJECTS	**'OPEN' CATEGORY Remote pilots**		**'SPECIFIC' CATEGORY Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**A1, A2 and A3**	**A2 only**	**Standard scenarios (STSs)**	**No STSs (generic training)**
Briefing, debriefing, and feedback		(1) Shut down and secure the UAS; (2) carry out a post-flight inspection and record any relevant data on the general condition of the UAS (its systems, components, and power sources); (3) conduct a review of the UAS operation; and (4) identify situations when an occurrence report is necessary and complete the required occurrence report.	(1) Shut down and secure the UAS; (2) make a post-flight inspection and recording of any relevant data relating to the general condition of the UAS (its systems, components, and power sources) and crew fatigue; (3) conduct a debriefing about the operation; and (4) identify situations when an occurrence report is necessary and complete the required occurrence report.	Same as for A2.

SUBJECTS	**SPECIFIC CATEGORY** **Remote pilots and all the personnel in charge of duties essential to the UAS operation**	
Subcategory	**Standard scenarios (STSs)**	**No STSs (training specific to a UAS operation)**
	n/a	Source: — UAS.SPEC.050(d). Elements in: — AMC3 UAS.SPEC.050(1)(d) 'Responsibilities of the UAS operator'. (a) Night operations; (b) Overflight (flight over known populated areas or over assemblies of people in a given area of operation that is located in urban environment); (c) BVLOS operations; (d) Low-altitude (below 500 ft) controlled airspace (LACA); (e) Non-segregated flight; (f) Transport and/or dropping of cargo; (g) Transport of dangerous goods; (h) Operations with multiple UASs and UAS swarms; (i) UAS launch and recovery using special equipment; (j) Licensed aerodromes, airport, and heliport operations; and (k) Flying over mountainous terrain.

8. Quality of the NPA

To continuously improve the quality of its documents, EASA welcomes your feedback on the quality of this NPA with regard to the following aspects:

8.1. The regulatory proposal is of technically good/high quality

[Please choose one of the options below and place it as a comment in CRT; if you disagree or strongly disagree, please provide a brief justification.]
Fully agree / Agree / Neutral / Disagree / Strongly disagree

8.2. The text is clear, readable and understandable

[Please choose one of the options below and place it as a comment in CRT; if you disagree or strongly disagree, please provide a brief justification.]
Fully agree / Agree / Neutral / Disagree / Strongly disagree

8.3. The regulatory proposal is well substantiated

[Please choose one of the options below and place it as a comment in CRT; if you disagree or strongly disagree, please provide a brief justification.]
Fully agree / Agree / Neutral / Disagree / Strongly disagree

8.4. The regulatory proposal is fit for purpose (capable of achieving the objectives set)

[Please choose one of the options below and place it as a comment in CRT; if you disagree or strongly disagree, please provide a brief justification.]
Fully agree / Agree / Neutral / Disagree / Strongly disagree

8.5. The impact assessment (IA), as well as its qualitative and quantitative data, is of high quality

[Please choose one of the options below and place it as a comment in CRT; if you disagree or strongly disagree, please provide a brief justification.]
Fully agree / Agree / Neutral / Disagree / Strongly disagree

8.6. The regulatory proposal applies the 'better regulation' principles[1]

[Please choose one of the options below and place it as a comment in CRT; if you disagree or strongly disagree, please provide a brief justification.]
Fully agree / Agree / Neutral / Disagree / Strongly disagree

8.7. Any other comments on the quality of this NPA (please specify)

Note: Your comments on this Section will be considered for internal quality assurance and management purposes only and will not be published in the related CRD.

[1] For information and guidance, see:
- https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how_en
- https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how/better-regulation-guidelines-and-toolbox_en
- https://ec.europa.eu/info/law/law-making-process/planning-and-proposing-law/better-regulation-why-and-how/better-regulation-guidelines-and-toolbox/better-regulation-toolbox_en