European Union Aviation Safety Agency

Draft Opinion

in accordance with Article 16 (Accelerated procedure) of MB Decision No 18-2015

Standard scenarios for UAS operations in the 'specific' category

RMT.0729

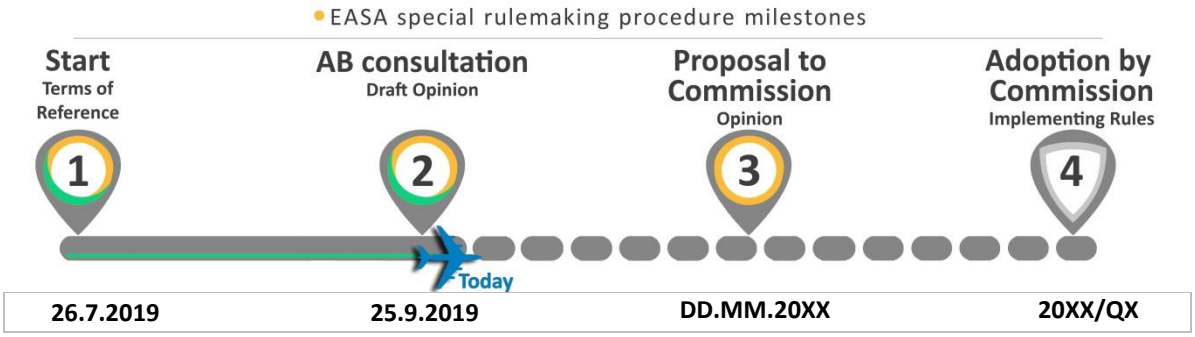
EXECUTIVE SUMMARY

The objective of this Opinion is to provide cost-efficient rules for low-risk unmanned aircraft systems (UAS) operations in the 'specific' category.

This Opinion proposes the addition of two standard scenarios (STSs) as an Appendix to Regulation (EU) 2019/947, defining the conditions when a UAS operator can start an operation after having submitted a declaration to the competent authority. Moreover, two new Parts to Regulation (EU) 2019/945 are proposed, including the technical requirements for UAS to be operated in the STSs, and establishing two new UAS classes, which are classes C5 and C6. The conditions to conduct the STSs are based on the in-service experience of some Member States (MSs) and they have been validated through the application of the specific operations risk assessment (SORA).

The proposed changes are expected to increase the cost-effectiveness for UAS operators, manufacturers and competent authorities, and to improve the harmonisation of UAS operations in the MSs.

Action area:	Regular updates		
Affected rules:	Commission Implementing Regulation (EU) 2019/947 on the rules and procedures for the operation of unmanned aircraft Commission Delegated Regulation (EU) 2019/945 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems		
Affected stakeholders:	Operators (private and commercial); competent authorities; flight crews; remote pilots; maintenance staff; design and production organisations; other airspace users (manned aircraft); service providers of air traffic management/air navigation services (ATM/ANS) and other ATM network functions; air traffic services (ATS) personnel; aerodromes operators; general public; model aircraft associations; EASA (on a case-by-case basis)		
Driver:	Efficiency/proportionality	**Rulemaking group:**	No
Impact assessment:	None	**Rulemaking Procedure:**	Accelerated



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1. About this draft Opinion

1.1. How this draft Opinion was developed

The European Union Aviation Safety Agency (EASA) developed this Opinion in line with Regulation (EU) 2018/1139[1] (the 'Basic Regulation') and the Rulemaking Procedure[2].

This rulemaking activity is included in the European Plan for Aviation Safety (EPAS) 2019-2023 under rulemaking task RMT.0729. The scope and timescales of the task were defined in the related ToR[3].

The draft text of this Opinion has been developed by EASA with the support of a group of experts made up of members of selected national aviation authorities (NAAs), with experience at the national level in UAS operations to be covered by these STSs. These experts were also members of the JARUS team that developed the methodology for the risk assessment included in SORA. This draft Opinion will undergo consultation with the Advisory Bodies in accordance with Article 16 'Special rulemaking procedure: accelerated procedure' of MB Decision No 18-2015. EASA has taken the decision to follow the procedure laid down in said Article as this regulatory proposal affects a limited group of stakeholders. Prior to the consultation with the Advisory Bodies, EASA performed a focused consultation on this regulatory proposal with all the interested parties, including UAS manufacturers, NAAs, UAS and manned operators, service providers of air ATM/ANS and other ATM network functions, and aerodrome operators on 1 July 2019.

The major milestones of this rulemaking activity are presented on the title page.

1.2. How to comment on this draft Opinion

Please submit your comments via email to **drones@easa.europa.eu** using the Excel spreadsheet provided as Appendix 3.

The deadline for submission of comments is **14 October 2019.**

1.3. The next steps

Based on the comments received, EASA will develop an opinion that contains the proposed amendments to Regulations (EU) 2019/945 and 2019/947. A summary of the comments received will be provided in the explanatory note to the opinion.

The opinion will be submitted to the European Commission, which will use it as a technical basis in order to prepare EU regulations. These regulations will contain the proposed amendments to

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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/sites/default/files/dfu/ToR%20RMT.0729%20Issue%201%20.pdf

Implementing Regulation (EU) 2019/947 and Delegated Regulation (EU) 2019/945 (from now on referred to as the IA and DA respectively).

2. In summary — why and what

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

With EASA Opinion 01/2018 on the introduction of a regulatory framework for operations of unmanned aircraft systems in the 'open' and 'specific' categories, EASA presented the concept of standard scenarios (STSs) for UAS operations in the 'specific' category that are characterised by a low risk. Those UAS operations can be conducted based on a declaration submitted by the UAS operator to the NAA. The approach proposed in the EASA Opinion was to define in the Regulation the process to allow such types of UAS operations, and then include it in a Decision issued by EASA, including the acceptable means of compliance (AMC), and the detailed description of the mitigation measures to be put in place. During the discussion within the EASA Committee, leading to the approval of the regulation, it was decided to also include in the text of the Regulation the above-mentioned mitigation measures. Since a final version of an STS was not yet available at that time, it was decided to approve the IA with a provision for an Appendix 1 to be filled in as soon as the first STS was proposed by EASA. As a transitional measure, Article 23(2) was introduced to allow MSs to accept declarations based on national STSs until the IA is amended to include the first EU STS.

In order to identify the UAS operations to be covered by the STS, EASA carried out a survey among all Member States to identify the UAS operations which are allowed, according to national regulations, based on a declaration submitted by the UAS operator. Two types of UAS operations were then identified, and they led to the development of two standard scenarios, STS-01 and STS-02. These two STSs were developed based on the experience gained in some Member States[4] and in addition, a risk assessment, based on the specific operations risk assessment (SORA) (see AMC 1 to Article 11 to the IA), was carried out to validate the approach.

Since it was decided to also impose for STSs the use of UAS with particular CE class marks, an amendment to the DA was also necessary, to define the requirements for the two new CE classes C5 and C6 to be used respectively with STS-01 and STS-02.

Lastly, some improvements to the IA and the DA were introduced as described in paragraphs 2.3.5 and 2.3.6.

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 the achievement of the overall objectives by addressing the issues outlined in Section 2.1.

The specific objective of this proposal is, therefore, to:

— ensure that (emerging) safety issues are addressed;

— incorporate improvements that result from relevant developments in new technologies and the application of the UAS Regulations (Regulations (EU) 2019/947 and 2019/945); and

— develop standard scenarios for those UAS operations in the 'specific' category that are considered mature enough, based on a declaration by the UAS operator.

[4] Especially in France, Spain, Denmark and Finland.

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

According to point UAS.SPEC.020 of the IA, STSs will be developed only for UAS operations in the 'specific' category with a low risk (i.e. with a specific assurance and integrity level (SAIL), as defined in SORA, not greater than 2). For these UAS operations, the UAS operator will be allowed to start the operation as soon as he or she has submitted a declaration to the NAA of registration and has received the receipt of confirmation and completeness. Since the NAA is not required to make any additional checks before the start of the operation (the UAS operator will, however, be included in the oversight program of the NAA), it was decided to define the requirements for these UAS operations in a prescriptive way. Therefore, they have been developed with a structure and a level of detail similar to those listed in the 'open' category.

The two STSs included in this Opinion have been derived from the in-service experience gained in some Member States where large numbers of UAS operations have been conducted and many flight hours were accomplished (in the order of tens of thousands[5]) without any accidents being recorded. In some of these Member States, such UAS operations are subject to an operational declaration (as defined by the national regulations) or are even conducted without the need for a declaration. The two STSs are related to the following UAS operations:

— STS-01: VLOS operations at a maximum height of 120 m, over controlled ground areas that can be in populated (e.g. urban) environments, using UAS with MTOMs of up to 25 kg; and

— STS-02: BVLOS operations with the UA at not more than 2 km from the remote pilot, if visual observers are used, at a maximum height of 120 m, over controlled ground areas in sparsely populated environments, using UAS with MTOMs of up to 25 kg.

The requirements proposed in the STSs have been developed to ensure that the resulting level of risk of UAS operations is consistent with the declarative regime defined in Article 5(5) and point UAS.SPEC.020 of the IA.

The template of the declaration to be submitted by the UAS operator is proposed in Appendix 2 to the IA.

2.3.1. Description of STS-01

STS-01 may be considered as an extension of the UAS operations in the 'open' subcategory A2[6], since it allows UAS operations in VLOS, in urban environments, below 120 m, with a UAS having an MTOM of less than 25 kg. Therefore, several of the requirements defined in STS-01 are similar to those for the 'open' subcategory A2.

2.3.1.1 Maximum flight height under normal operations

The UAS operator is required to define the volume within which the UAS can operate, called the 'flight geography'. The maximum vertical limit that the UAS operator can define for the flight geography for UAS operations under STS-01 is 120 m (from the closest point on the surface of the earth). From an air risk point of view, STS-01 is considered equivalent to subcategories A2 and A3 of the 'open' category, therefore, the operational limitations and the technical requirements imposed on the UAS

[5] E.g. in France, the number of flight hours in 2018 for operations in national scenario S-3 (equivalent to STS-01) was 94 577.

[6] VLOS Operations at a maximum height of 120 m, in an urban environment, using a UAS with an MTOM of up to 4 kg.

are consistent (e.g. VLOS and a maximum height of 120 m, except when overflying an artificial obstacle).

This limitation is a little more conservative than the in-service experience of some Member States where UAS operations similar to STS-01 are allowed up to a height of 150 m (500 ft). In STS-01, a 30 m margin above the maximum height has been considered for use in abnormal situations.

As in the 'open' category, the possibility was kept to operate the UA close to or above an artificial obstacle taller than 105 m (e.g. for building or infrastructure inspections) under the same conditions.

2.3.1.2 Ground risk: controlled ground area

UAS operations in a populated environment, with a UAS with an MTOM of up to 25 kg, may expose the overflown people to risk. Since the intrinsic ground risk needs to be kept low, a requirement to conduct such UAS operations over a controlled ground area is established.

As defined in Article 2(21) of the IA, a controlled ground area is '*the ground area where the UAS is operated and within which the UAS operator can ensure that only involved persons are present*'. The UAS operator is required to define the limit of the controlled ground area and to control the access of people to it. The controlled ground area comprises the flight geography area, the contingency area and the ground risk buffer as depicted in Figure 1. For additional information on the contingency area and ground risk buffer, please refer to paragraph 2.3.5.

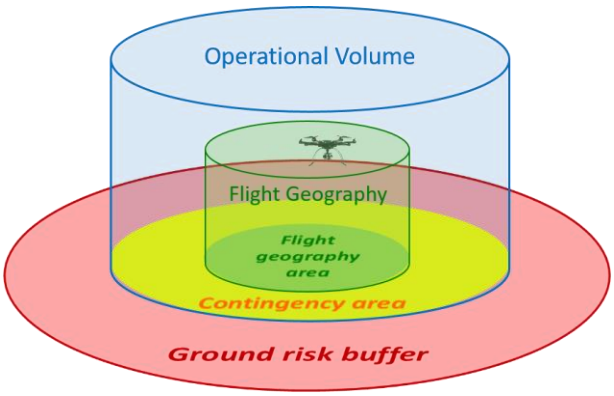


Figure 1. Notional depiction of the areas to be covered by the controlled ground area

Before conducting UAS operations under STS-01, UAS operators must ensure that the controlled ground area is in place, effective and compliant with the minimum distance defined in the proposed point UAS.STS-01.020(3) to the IA. For this purpose, the UAS operator must at least:

— be familiar with the intended area of operations and with all the factors that may affect the operation, especially in terms of safety, security, privacy and environmental protection;

— measure properly the required distances for effective implementation of the areas encompassed in the controlled ground area, identifying where necessary the elements that can assist the remote pilot in rapidly and visually estimating the distance to the UA;

— secure the perimeter of the controlled ground area in the most effective way to prevent uninvolved people from entering the area[7]; and

[7] Means may be fencing off the area, installing signs, using operations staff or law enforcement agents to interdict the area, or others.

— coordinate with the appropriate authority[8], when required.

Also, in order to protect any persons present in the controlled ground area, a requirement is established to have those persons informed of the risks of the operation, briefed, and, if applicable, trained on the safety precautions and measures established by the UAS operator for their protection. Besides, these persons must have explicitly agreed to participate in the operation in the manner established by the UAS operator.

Since keeping the UAS at a safe distance from uninvolved people is considered a critical safety aspect, the requirement has been expressed with a higher degree of prescriptiveness, and minimum values are established. To determine those values, the following aspects were considered:

— for the ground risk buffer, 'low' robustness is considered sufficient in UAS operations with a low intrinsic ground risk. In this case, SORA indicates the 1:1 rule[9] to select the minimum horizontal distance. However, the 1:1 rule may lead to a buffer size such that the size of the controlled ground area might be impractical in most cases in a populated environment[10]. Therefore, the decision was made to propose more suitable values considering the following elements:

  — to better ensure that the UA flight can be terminated without exceeding the ground risk buffer, UAS operations under this STS are limited to:

    — rotorcraft if the UA is not tethered, or any configuration except fixed-wing UA if tethered. With this limitation, UAS operations at low speed can be better ensured, and the likelihood of the UA gliding a distance great enough for it to fall outside the controlled ground area is minimised;

    — the ground speed in normal operation is limited to 5 m/s (which must be set in the UAS, see paragraph —) so that the controllability of the UA is increased.

  — there is more in-service experience with UA with MTOMs of less than 10 kg, so two sizes of ground risk buffer have been identified, taking a more conservative approach for heavier UA;

  — for UA with MTOMs of up to 10 kg, in-service experience from Member States[11] has been considered. In particular, the main reference is French scenario S-3, where a safety area is calculated assuming a ballistic fall once the flight termination system is triggered, and therefore, the size of that area is dependent on the flight height and speed[12] of the UA. This approach was preferred to a fixed distance, as prescribed in other Member States, which allows less flexibility and might be too conservative for UAS operations at low flight heights;

  — for UA with MTOMs above 10 kg, in-service experience is also considered, but since this experience is more limited, a more conservative approach is followed. In this case, the values considered were half of those derived from the 1:1 rule, except that a minimum

8 E.g. municipality, law enforcement, etc.

9 Example: If the UA is planned to operate at a height of 20 m, the ground risk buffer should at least be 20 m.

10 For instance, in a city, that size could mean securing an area too wide to be allowed by the municipality due to the consequent disruption, and also complex for the operator to implement.

11 For example: France (where S-3 is limited to 8 kg), Italy.

12 Ground speed, but wind must be considered by the UAS operator when establishing the areas.

of 20 m is considered in the case of a height of up to 30 m (thus, the values for UA above 10 kg are at least double those for the ones below 10 kg); and

— for tethered UA, the size of the controlled ground area considers a radius equal to the tether length plus 5 meters, and centred on the point where the tether is fixed over the surface of the earth. This is derived from in-service experience, in particular from tethered UAS operations in France, where this margin of 5 m was considered sufficient to account for the potential projection of debris in a crash subsequent to a flight termination.

— For the contingency area, it was considered that this area was primarily conceived to cope with abnormal situations that could take the UA outside the flight geography (e.g. wind gusts), where by performing appropriate contingency procedures, the UA can be brought back to a normal situation. In addition, in the case of a flyaway of the UA, it is expected that the flight termination system will be activated while the UA is still in the contingency area. This is the reason why a minimum distance of 10 m was considered necessary for the contingency area. Considering the ground speed limitation of 5 m/s, the remote pilot would have 2 seconds to react, which is consistent with the in-service experience of the Member States.

2.3.1.3 Remote pilot competency

In order to ensure an adequate level of competency for remote pilots, the following approach was followed. Since STS-01 covers UAS operations with a low intrinsic risk, similar to the level for 'open' subcategory A2, a similar approach to the one used for that subcategory is followed for remote pilot competency.

For the theoretical knowledge part, similarly to the requirements for 'open' subcategory A2, the student remote pilot will be granted a certificate issued by a competent authority or by an entity recognised by a competent authority of a Member State after:

— having passed the online theoretical knowledge examination as required for 'open' subcategories A1 and A3; and

— passing a classroom theoretical knowledge examination provided by the competent authority or by the entity recognised by the competent authority. Compared with the one defined for 'open' subcategory A2, more subjects and topics need to be covered, and two options are possible:

  — if the student remote pilot does not hold a certificate of remote pilot competency required for 'open' subcategory A2, the subjects to be covered by the examination are those listed in the proposed Attachment A to STS-01; or

  — if the student remote pilot holds a certificate of remote pilot competency for 'open' subcategory A2, he or she is only required to pass the examination on the reduced number of subjects indicated in point 2 of the proposed Attachment A to STS-01.

With this modular approach, credit can be taken from the knowledge already acquired by a student remote pilot when he or she has already conducted the training for the 'open' category.

For the practical skill part, the self-training and assessment by the student remote pilot allowed in 'open' subcategory A2 is not deemed sufficient. The particular operational provisions and limitations

of STS-01 to ensure that UAS operations remain at low risk are more critical than in 'open' subcategory A2 and, therefore, a higher level of robustness is required for the practical skill training and assessment.

Therefore, an external party is required to provide the practical skill training and assessment. This approach is consistent with the current experience in most Member States. However, discussions within the expert group indicated that the preference on the type of external party providing the training could vary significantly across EU, ranging from being a UAS operator (excluding self-training and assessment) to entities recognised by the competent authority. Consequently, it was decided to propose both options.

UAS operators intending to provide practical skill training and assessment to remote pilots (including its own pilots) must comply with a specific set of requirements, defined in the proposed Appendix 3 to the IA, and declare their compliance using the form in the proposed Appendix 4 to the IA.

Unlike the theoretical knowledge part, practical skills are peculiar to the specific scenario. Consequently, each certificate of completion of the practical training and assessment issued by the UAS operator or the entity recognised by the competent authority will be for one STS.

The main areas related to the practical skill to be covered are included in the proposed attachment A to STS-01.

In addition, according to point UAS.SPEC.050(1)(d) of the IA, the UAS operator needs to ensure that the remote pilot has the necessary skills required to safely conduct the particular UAS operations, through the training and familiarisation with the UAS and with the procedures defined by the UAS operator.

2.3.1.4 Operations Manual

In most Member States where UAS operations that would fall under the scope of STS-01 are being conducted, UAS operators are required to develop an operations manual (OM). This is further supported by SORA.

Therefore, a decision was made for STS-01 to require the UAS operator to compile its procedures in an OM, which shall contain at least all the elements defined in the proposed Attachment B to STS-01.

The operational volume and ground risk buffer for the intended operations, including the controlled ground area, are some of the elements to be defined in the OM, together with the procedures for normal, contingency and emergency conditions.

To ensure the adequacy of the contingency and emergency procedures, these should be evaluated by the UAS operator through either dedicated flight tests or simulations (provided that the representativeness of the simulation means is appropriate for the intended purpose. This is based on the current practices established in some Member States[13]. Furthermore, this approach is consistent with the 'medium' level of integrity required by SORA for operations with a risk corresponding to STS-01.

[13] For instance, in Spain, the Royal Decree 1036/2017 (national regulation for civil UAS operations) art. 27 (1)(b) requires UAS operators to conduct, prior to UAS operations, '*the necessary test flights to prove that the intended operation can be performed safely*'

As required in paragraphs (d) and (e) of points UAS.SPEC.050(1) of the IA, UAS operators must ensure that remote pilots, the personnel in charge of duties essential to the UAS operation and any staff member authorised to perform maintenance activities, are trained and assessed in accordance with the procedures, which for STS-01 are included in the OM.

2.3.1.5 Contingency and emergency procedures

The UAS operator is required to develop contingency and emergency procedures, to be described in the OM, and the remote pilot is required to put them in place immediately in the following conditions:

— contingency procedures: in abnormal situations, which includes situations that can lead to the UA exceeding the limits of the flight geography; and

— emergency procedures: in emergency situations, which includes situations that can lead to the UA exceeding the limits of the operational volume. The remote pilot is expected to react immediately, performing the relevant emergency procedures as soon as he or she has an indication of those situations. Furthermore, when the emergency situation is perceived as likely to lead to the UA being outside the operational volume, the remote pilot is required to trigger the flight termination system (FTS[14]) at least 10 m before the unmanned aircraft reaches the limits of the operational volume.

2.3.1.6 Emergency response plan

An emergency response plan (ERP) is considered an important element to ensure that the UAS operator's personnel participating in an operation are aware of what to do in case of an emergency in order to avoid an escalation of the effects.

In the discussions within the JARUS group, it was concluded that, even for UAS operations with the lowest risk in the 'specific' category, this plan should be required. Furthermore, in SORA, there is a penalty when this plan is not available or does not achieve a sufficient level of integrity.

Consequently, a requirement was established including the criteria provided by SORA for a 'medium' level of integrity, which is consistent with the level required for operational procedures.

Further guidance is provided in the acceptable means of compliance to the IA.

2.3.1.7 Externally provided services

UAS operators must ensure that externally provided services, which are necessary for the safety of UAS operations (e.g. external C2 services, GNSS services, U-Space services, etc.), reach a level of performance that is adequate for the operation. In order to ensure this, UAS operators must consider:

— the information provided by the UAS manufacturers[15];

— specific requirements that might be applicable in the intended area of operation[16];

— how performance might be affected by the environmental conditions[17]; and

[14] For additional information please refer to 2.3.1.9.

[15] E.g. the minimum number of GNSS satellites from which signals must be received to conduct a safe operation under a specific flight mode.

[16] E.g. certain U-space service with a certain level of performance might be required to operate in a certain area.

[17] E.g. electromagnetic fields, meteorological conditions, obstacles, etc.

— what level of performance can be provided and adequately supported by the external service provider.

It is also important to ensure that adequate service is provided, and the allocation of roles and responsibilities between the operator and the external service provider(s) needs to be defined, if applicable[18].

2.3.1.8 Level of human involvement

There is currently no experience with autonomous UAS operations (without remote pilot intervention), thus this kind of UAS operations is not allowed under STS-01. Therefore, a remote pilot is always required to be in command of the operation.

Furthermore, the remote pilot must have the ability to maintain control of the UA, except in the case of a lost command and control link[19].

In addition, in order to avoid a level of complexity that might lead to a higher level of risk for STS-01, the following operational limitations were included:

— operate only one UA at a time;

— do not operate from a moving vehicle; and

— do not hand over the command of the UA to another remote pilot station.

2.3.1.9 Technical requirements in STS-01

It is proposed that UAS to be operated under STS-01 should bear a C5 class mark. Such UAS will have to comply with the technical requirements included in the proposed Part 16 of the DA.

The technical requirements of class C5 were built up starting from those defined for class C3. It was decided to require for class C5 the same technical requirements as those for class C3, with the exception of:

— the maximum height limitation, since the provision of height information to the remote pilot (see below) is considered sufficient, taking into account in-service experience with similar operations in some Member States and the fact that a higher competency is required for remote pilots operating under this STS compared with the 'open' category;

— geo-awareness: the need to require a geo-awareness system was extensively discussed, and it was decided to keep it as optional in case the UAS is operated in a geographical zone where the Member States mandate it. In any case, if the manufacturer decides to equip the UAS with a geo-awareness system, this needs to comply with the same requirements as those for a class C3 UAS.

The following additional technical requirements were added:

[18] Typically, this is part of a service level agreement (SLA), but for some services, this may not be necessary, e.g. an open GNSS service (free of charge) does not require any SLA between the UAS operator and the GNSS service provider and therefore there is no need to define those roles and responsibilities.

[19] For other failures, the remote pilot must be able to perform contingency or emergency procedures (depending on the nature and potential effects of the failure(s)). In case of a loss of the C2 Link, there is a requirement for the UAS to include a predictable method to recover the link or terminate the flight), see paragraph 2.3.1.9)

— the characteristic dimensions[20] of the UA are limited to 3 m, in accordance with the limit established in point UAS.SPEC.020(1)(a)(i) of the IA. The MTOM is limited to 25 kg since most Member States do not have relevant experience with UA with a higher mass in UAS operations under the scope of STS-01. In addition, the UA is limited to rotorcraft or a tethered aircraft other than fixed-wing aircraft, as explained in paragraph 2.3.1.2. The MTOM threshold, combined with the UA configurations and the maximum characteristic dimensions, ensures that the expected kinetic energy is consistent with a low ground risk classification (see paragraph 2.3.1.2);

— a requirement is established for the UA, unless tethered, to be equipped with a reliable and predictable means for the remote pilot to terminate the flight of the UA (called a flight termination system – FTS). The FTS needs to allow the remote pilot to:

  — prevent the UA exiting the controlled ground area. Thus, the FTS should force the descent of the UA and prevent it from continuing its horizontal trajectory (e.g. by cutting the propulsion power); and

  — avoid a single failure in the UA disabling the activation of the FTS. Therefore, the activation system is required to be independent from the on-board automatic flight control and guidance system of the UA;

  Experience with this type of UAS operations[21] has shown that human factors may play a role in reducing the effectiveness of the FTS. In particular, there is a risk that the remote pilot does not activate the FTS in time, fearing the damage and the potential destruction of the UA. To mitigate this risk, a requirement to reduce the effect of the UA impact dynamics (e.g. a parachute) has been added;

— provide information on the speed and flight height of the UA. This is based on the current in-service experience and considering the need to facilitate the task of the remote pilot in keeping the UA within the planned flight geography;

— provide information on the signal strength of the command and control link, and receive an alert from the UAS when it is likely that the signal is going to be lost, and another alert when the signal is lost;

— a selectable low speed mode to reduce the ground speed to no more than 5 m/s to ensure that the remote pilot can keep the UA within the controlled ground area (as described in paragraph 2.3.1.2); and

— in addition to the information required in the user's manual for a class C3 UA, a description of the means to terminate the flight is required.

The possibility to develop an accessory that may convert a UAS class C3 into a class C5 was also included. Consistently with the requirements imposed on UAS class C5, only rotorcrafts UAS marked class C3 can qualify to be equipped with such accessory. In addition the C3 class UAS needs to be equipped with an interface able to accept the accessory. In this way manufacturers, even if different for the one designing and producing the UAS class C3, may put on the market the accessory. However

[20] E.g. main rotor diameter in a helicopter or gyroplane, distance between opposite rotors in a multi-rotor, longitude of body in an airship, etc.

[21] Mainly French scenario S-3.

they are responsible to verify that the UAS equipped with the accessory complies with all the requirements listed for UAS class C3 and the requirements of class C5 with the exclusion of the information on the height limitation. This exclusion is justified by the availability of a height limitation as part of the requirements for the C3 class. In addition manufacturers of the accessory shall put it on the market as a single kit and they shall make sure that the UAS operator does not need any special skill to install the kit on the UAS (the instructions shall be included in the user's manual). Moreover in case one of the elements of the kits is not properly installed, the remote pilot shall not be able to operate the UAS. Lastly the class C5 mark should be affixed on the accessory so that the UAS displays both the C3 and C5 class mark.

2.3.2. Description of STS-02

STS-02 refers to a UAS operation with an increased intrinsic risk compared with STS-01 due to the fact that it allows BVLOS operations. The launch and recovery of the UAS is, in any case, required to be performed in VLOS. The main mitigation means is provided by visual observers who assist the remote pilot in scanning the airspace for the presence of other airspace users.

2.3.2.1 Maximum flight height

It is proposed that the UAS operations covered by STS-02 should have the same height limitation as for STS-01. Therefore, the considerations included in paragraph 2.3.1.1 apply.

2.3.2.2 Ground risk: controlled ground area

STS-02, in comparison with STS-01, has an increased ground risk due to the larger area that the UA can cover. Therefore, the combination of the following main limitations is established to lower the intrinsic ground risk, based on the current experience in some Member States[22]:

— operations shall be conducted over a controlled ground area, and

— that controlled ground area shall be entirely located in a sparsely populated area.

It should be noted that when a controlled ground area is in place, SORA (see Section **Error! Reference s ource not found.**) does not distinguish, in the intrinsic ground risk classification, between UAS operations being conducted in a populated environment and those over sparsely populated areas, or between VLOS and BVLOS. However, SORA assumes that such a controlled ground area is established, without any further considerations (it is up to the UAS operator to ensure it is in place and effective). However, it is clear that the difficulty in ensuring control over an area (being able to detect and react to the intrusion of people who are not involved) increases from operations in VLOS to those in BVLOS. This can be compensated for by the population of the environment (with a lower likelihood of intrusion in the case of sparsely populated areas).

Therefore, requiring UAS operations under STS-02 to be conducted over sparsely populated areas makes it easier to ensure control over the controlled ground area. In addition, to further ensure this control over the area, and also considering the still relatively limited experience with larger ranges in BVLOS operations, the distance between the UA and the remote pilot is limited.

[22] E.g. in France and Spain, UAS operations allowed in BVLOS under declaration are required to be conducted in sparsely populated areas. In addition, S-3 (BVLOS scenario under declaration) in France requires establishing a safety area, equivalent to a controlled ground area.

As illustrated in Figure 1, the remote pilot may fly without the assistance of a visual observer in BVLOS, up to a range of 1 km, when the UA flies a pre-programmed flight, allowing the remote pilot to scan the airspace himself or herself. When visual observers are employed, the range of the operation can be extended up to 2 km.

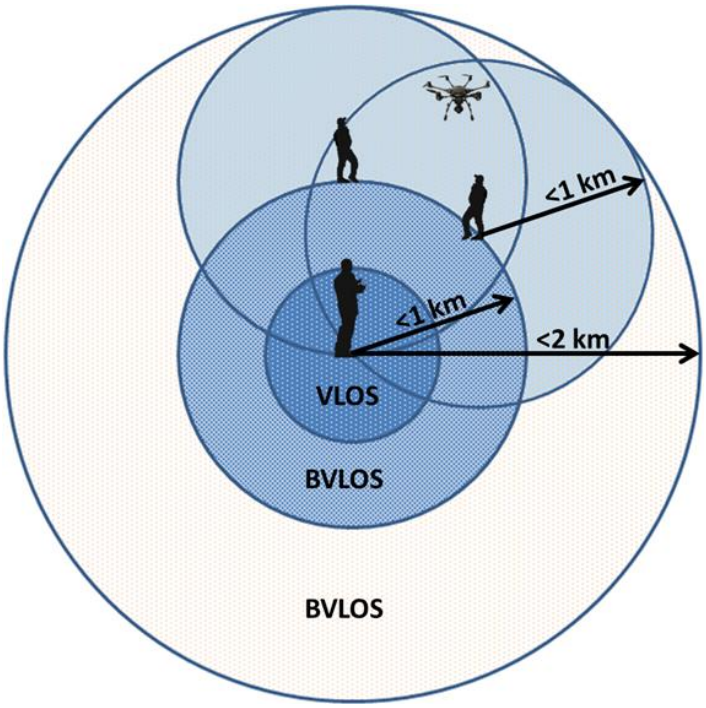


Figure 1 – Range of STS-02

When more experience has been gained, this STS may be amended to alleviate this limitation.

Unlike STS-01, operations under STS-02 have the possibility to be conducted over wider areas, using a wider range of UAS (not limited to rotorcraft, if untethered) and without a restrictive speed limitation. Therefore, establishing minimum distances for the ground risk buffer as in STS-01 was not deemed reasonable. Besides, the criterion in SORA to use the 1:1 rule as a minimum was not deemed satisfactory either, as it might be too conservative in some cases, and fall short in other cases. It was considered more appropriate to require the UAS manufacturer to provide information, in the user's manual, on the minimum distance that the UA is likely to travel once the means to terminate the flight has been activated. This will be the information that the UAS operator needs to use to determine the minimum size for the ground risk buffer.

The launch (e.g. take-off) and the recovery (e.g. landing) are also required to be performed in VLOS. That is mainly to mitigate the ground risk, especially for people involved in the UAS operation. This requirement also facilitates visually detecting during the launch any potential failure or unexpected performance that might have worse consequences if not detected during this phase.

2.3.2.3 Air risk: mitigations for BVLOS

To mitigate the increased air risk posed by BVLOS operations, the following requirements are established:

— an amendment to point UAS.SPEC.020(b) of the IA, which defines the airspace where operations covered by STS may take place, is proposed to highlight the need to ensure a low probability of encounter with manned aircraft (see the further explanation under the risk assessment in Appendix 2);

— a minimum visibility of 5 km is proposed to ensure the detection of any potential hazard in the air. This was proposed by JARUS in the frame of the SORA development and is also established in the regulations covering UAS operations in some states[23].

— someone is always required to scan the airspace to detect any potential hazards in the air. If no visual observer (VO) is used, then the scanning must be conducted by the remote pilot. From experience in some states[24], having the UA at not more than 1 km from the remote pilot (in combination with the 120 m height limitation) is considered a suitable distance to see the surrounding airspace and react promptly if required. However, if the remote pilot is required to perform the airspace scanning, the management of the flight must be such that it does not require too much attention. For this reason, the requirement to have a pre-programmed trajectory for the UA is established when operating without VOs.

— If VOs are used, the UAS operator is required to ensure that:

  — the VOs are positioned so that they can provide adequate coverage of the operational volume and the surrounding airspace with the minimum flight visibility indicated, and there are no potential terrain obstructions;

  — the distance between any visual observer and the remote pilot is not more than 1 km, to ensure better control of VOs and their communication with the remote pilot;

  — robust and effective communication means are available for the communication between the remote pilot and the VOs.

  — if means are used by the VOs to determine the position of the UA, those means are functioning and effective; and

  — the VOs have been briefed on the intended path of the UA and the associated timing.

It should be noted that a definition of a VO is proposed in Article 2 of the IA. The responsibilities of VOs are proposed in point UAS.STS-02-050 of the IA:

— to perform unaided visual scanning of the airspace in which the UA is operating for any potential hazards in the air;

— to maintain awareness of the position of the UA through direct visual observation or through assistance provided by electronic means; and

— to alert the remote pilot in case a hazard is detected, and assist in avoiding or minimising the potential negative effects.

[23] E.g. in the USA, part 107 establishes for VLOS operations a visibility of at least 3 statute miles (~ 5 km).

[24] E.g. the closest scenario in France to STS-02 is S-2 (under declaration) in which a maximum distance of 1 km is established between the UA and the remote pilot.

The distance of the UA from the remote pilot is proposed to be limited to not more than 2 km if VOs are used. In this way, the area to be covered by VOs is also limited, reducing their number and/or workload and, and therefore reducing the complexity and related risk of the operation.

To further ensure that the ground and air risks remain low, a technical requirement is established to ensure that the flight of the UA is contained in the flight geography through a function allowing the programming of the flight volume and preventing the UA from exceeding it. This requirement, also known as geo-caging, stems from in-service experience with current operations in BVLOS[25].

2.3.2.4 Remote pilot competency

For STS-02, the same theoretical knowledge training and assessment as for STS-01 is established, resulting in a common certificate issued by the competent authority or an entity recognised by that authority, after the remote pilot student has passed the online test and classroom examination at that authority or entity.

The same scheme for the practical skill training and assessment is also proposed, but in this case, there are some differences in the elements to be covered: STS-02 includes the elements defined for STS-01 plus additional topics related to BVLOS and the use of VOs, as indicated in point A2 to Attachment A to STS-02. Consequently, the certificate issued by the entity responsible for the training and assessment covers only STS-02.

2.3.2.5 Operations Manual

It is proposed that the UAS operations covered by STS-02 should have the same requirements for the OM of STS-01. Therefore, the considerations included in paragraph 2.3.1.4 apply.

2.3.2.6 Contingency and emergency procedures

The same considerations provided in paragraph 2.3.1.5 are valid for STS-02 except that for STS-02, as the area is wider and less populated, no specific value is defined for when the remote pilot should put in place the emergency procedures. The UAS operator is required to define it case by case.

2.3.2.7 Emergency response plan

It is proposed that the UAS operations covered by STS-02 should have the same requirements for the emergency response plan as STS-01. Therefore, the considerations included in paragraph 2.3.1.6 apply.

2.3.2.8 Externally provided services

It is proposed that the UAS operations covered by STS-02 should have the same requirements for the externally provided services as STS-01. Therefore, the considerations included in paragraph 2.3.1.7 apply.

2.3.2.9 Level of human involvement

It is proposed that the UAS operations covered by STS-02 should have the same requirements for the level of human intervention as STS-01. Therefore, the considerations included in paragraph 2.3.1.8 apply.

[25] In particular, in France the declarative French scenario S-2 (BVLOS up to 1 km) includes the requirement to equip the UA with a system to 'prevent in real time the aircraft to exceed the horizontal limits of a programmable flight volume'

2.3.2.10 Technical requirements in STS-02

It is proposed that UAS to be operated under STS-02 should bear a C6 CE class mark. This can be affixed once it is demonstrated that the UAS complies with the technical requirements included in the proposed Part 17 of the IA.

As for the technical requirements of class C5, it was decided to require for class C6 the same technical requirements as for class C3, with the exception of those that are also excluded for class C5 (refer to paragraph 2.3.1.9), and in addition the following:

— as for class C3, the UA characteristic dimension[26] is proposed to be limited to 3 m, and the MTOM to 25 kg. To ensure that the expected kinetic energy is consistent with a low ground risk classification (see paragraph 2.3.1.2), for C6 class UAS, the maximum ground speed is proposed to be limited to 50 m/s;

— a geo-caging function is proposed, as explained in Section 2.3.2.2, in order to ensure the containment of the UA within the flight geography;

— an FTS is proposed as for class C5, with the exception that in the case of a class C6 UAS, considering the environment of the operation, the human factors aspect is less important in the effectiveness of the means to terminate the flight. Therefore, the requirement on the means to reduce the effect of the UA impact dynamics (e.g. a parachute) is not proposed;

— provide information on the speed and flight height of the UA as proposed as for class C5, however, since STS-02 covers BVLOS operations, for class C6, it is proposed to also provide the geographical position of the UA. It should be noted that, even if STS-02 covers BVLOS operations, as the range is still relatively short (max. 2 km distance from the remote pilot), the use of the take-off point as the reference for the height information is still considered valid, as shown by the in-service experience;

— as explained in Section 2.3.2.3, a means to programme the UA flight trajectory is proposed;

— as for class C5 UAS, provide information on the signal strength of the command and control link and receive an alert from the UAS when it is likely that the signal is going to be lost, and another alert when the signal is lost;

— in addition to the information required in the user's manual for class C3, it is also proposed to add for class C6:

  — a description of the FTS;

  — a description of the function that limits UA access to certain airspace areas or volumes, which includes the 'geo-caging' function; and

  — the distance most likely to be travelled by the UA after the activation of the means to terminate the flight, to be considered by the UAS operator when defining the ground risk buffer (see paragraph 2.3.2.2).

For the C6 class it was decided not to propose the possibility to develop an accessory transforming a UA class C3 into class C6. Some requirements mandated in the C6 class highly depend on the software

[26] E.g. the main rotor diameter in a helicopter or gyroplane, distance between opposite rotors in a multi-rotor, longitude of body in an airship, etc.

of the flight control system (e.g. the geo-caging) and only the original manufacturer of the UAS will be able to develop it.

2.3.3. Verification of compliance of the technical requirements

The verification of compliance of the UAS with the technical requirements will be ensured via the CE mark process, using the same approach defined for UAS operated in the 'open' category. This decision was taken because for low risk operations (i.e. SAIL[27] I and SAIL II), SORA considers a declaration by the UAS operator as an acceptable means to demonstrate compliance with the mitigation measures and the operational suitability objectives (OSO) required to make the operation safe. When the UAS operator is not the manufacturer of the UAS, he or she does not necessarily have the competency to assess the compliance of the UAS with the technical requirements, and therefore he or she cannot systematically take the responsibility that belongs to the manufacturer. According to Regulation (EU) 2018/1139 a 'certificate' may be provided to the manufacturer through the 'aviation regulation' (i.e. Part-21) or the 'CE' mark process. Considering the risk of the UAS operations covered by STSs, the CE mark process is considered the most proportionate approach. Therefore two new classes of UAS, C5 and C6, have been developed, and the requirements are listed in two new Parts, 16 and 17, of the DA.

The requirements for these new classes are based on those already defined for class C3, however, in some cases, it was considered that a requirement defined for the 'open' category was not essential for safe operations of these STSs (e.g the height limitation). It is envisaged that future STSs may not necessarily drive the creation of new UAS classes, rather that they may accept the use of a UAS of an already existing class, reducing the proliferation of classes. It should be noted that a manufacturer may mark a UAS with multiple CE markings (e.g. C3 and C5) if it complies with the technical requirements defined in the relevant parts.

The possible conformity assessment procedures (called 'modules') that the manufacturer can use to demonstrate that a class C5 and C6 UAS conforms to the technical requirements are defined in Decision No 768/2008/EC. The modules allowed were selected based on the consideration that the level of risk of UAS operations covered by STS-01 and ST-02 is at least similar to that related to the 'open' category, and that the availability of some of the technical requirements imposed may directly impact the safety of the UAS operation (e.g. the FTS). Similarly to UAS classes C1, C2 and C3, it was therefore decided to impose on UAS classes C5 and C6 the verification by notified bodies that the design complies with the technical requirements or the implementation of a quality assurance system.

Finally, it should be noted that UAS operations similar to those defined in STS-01 and STS-02, conducted with a UAS not marked as class C5 or C6 (e.g. with a privately built UAS), may still be conducted under the authorisation of an NAA. For these UAS operations, EASA will develop a predefined risk assessment, mirroring STS-01 and STS-02, allowing a simplified process for the UAS operator to receive an authorisation.

2.3.4. Applicability

The amendment introducing the STSs cannot be made applicable immediately after the date of entry into force, since manufacturers may need some time to develop and put on the market UAS marked class C5 and class C6. It was therefore decided to postpone the applicability to 18 months after the entry into force of the amended Regulation (i.e if the amendment is adopted by the end of 2020, the

[27] Specific Assurance and Integrity Level, determined at the end of the SORA process.

entry into force will be 20 days after that, and the applicability will be from June 2022). This means that until the date when the amendement becomes applicable, UAS operators may appy national regulations and they may submit declarations based on national STSs, if the national framework allows it. After this date (i.e June 2022), only declarations based on the EU STSs can be submitted. Declarations based on national STSs, submitted until the date of applicability (i.e. June 2022), may still be valid for 2 years (i.e. until June 2024).

2.3.5. Additional improvements proposed for Regulation (EU) 2019/947 (IA)

The following improvements to the IA are proposed.

— According to some commenters, the definition of 'uninvolved person' was not clear, since the conditions to fit within the definition are all expressed in a negative way. It is therefore proposed to replace this definition with 'involved person' having a similar content with the conditions made positive. Therefore the text 'uninvolved person' was replaced with 'involved persons' in all instances where it appears in the IA.

— STS-02 introduces the role of 'visual observer'. This role should not be confused with the 'UA observer' mentioned in point UAS.OPEN.060(4). Therefore, the definitions of both roles have been introduced. The 'UA observer' supports the remote pilot in keeping the UA in VLOS, and needs to be situated alongside the remote pilot. This role was introduced to allow operations in first person view (FPV) when the remote pilot does not have a wide view of the area where the UAS is flying. The 'visual observer' instead has the role to scan the sky and inform the remote pilot when he or she sees other airspace users or obstacles (such as paragliders, parachutes, SAR operations etc).

— The definitions of 'flight geography', 'flight geography area', 'contingency volume', 'contingency area', 'operational volume' and 'ground risk buffer' have been introduced to support the identification of the areas where the UAS needs to be operated when applying an STS.

  The UAS operator is required to identify:

  — the flight geography, where the UAS operator plans to conduct the operation under normal procedures,

  — the contingency volume, in which the UA will be contained when the contingency procedures are applied, and

  — the ground risk buffer to protect third parties on the ground in the event of any unexpected behaviour of the UA that could result in the UA leaving the operational volume.

  Figure 2 provides a representation of the flight geography, the contingency volume and the ground risk buffer.

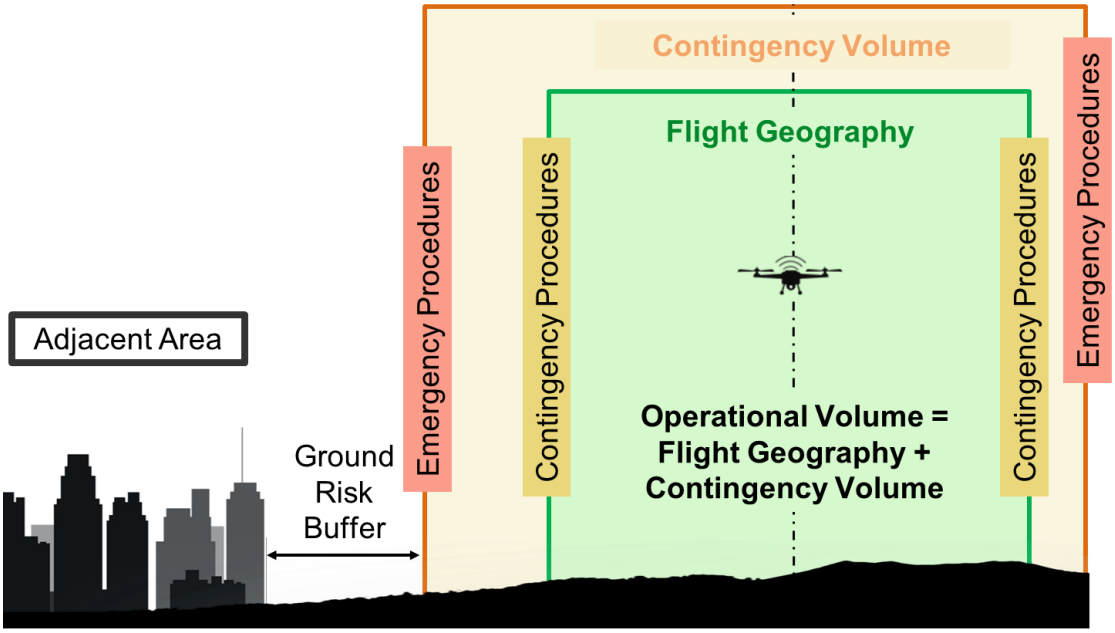


Figure 2 - Flight geography, contingency volume and ground risk buffer

— Paragraph 5 of Article 5 has been modified to specify that the declaration to be submitted by the UAS operator is defined in Appendix 2 of the IA.

— Points UAS.OPEN.020 and UAS.OPEN.030 have been modified to clarify that the training can be provided by the competent authority or by an entity recognised by the competent authority of one EU Member State, not necessarily the Member State of registration.

— Point UAS.OPEN.040 has been modified to require the remote pilot to be familiar with the user's manual provided by the manufacturer of the UAS.

— Point UAS.SPEC.020 has been modified to limit the operations of UAS to the airspace where the probability of encountering manned aircraft is considered low, when in uncontrolled airspace. Member States are required to make this determination through geographical zones. Operations in controlled airspace still require coordination in accordance with the published procedure for the area of operation, but an individual authorization may not always be necessary. Moreover, it has been clarified that this requirement is to ensure a low probability of encountering a manned aircraft.

— Point UAS.SPEC.050 has been modified to require the UAS operator to keep, and maintain up-to-date for a minimum of 3 years, a record of the qualifications of the personnel employed and the maintenance activities conducted on the UAS. In addition, a requirement was added to ensure that the UAS is equipped with a green flashing light when operating at night and at a height lower that 120 m. This decision was based on the need for the enforcement authority to differentiate a UAS from a manned aircraft, consistent with the requirement imposed on the UAS operated in the 'open' category. The decision on the type and colour of the light to be used for these UAS was based on the capability of the human eye to distinguish colours and on the schemes already used on manned aircraft. It was considered that manned aircraft already use white and red flashing lights, while blue flashing lights are used for emergency purposes.

According to the 1931 CIE chromacity diagram[28], the colours that the human eye can best distinguish are green, blue and red. Therefore, the only available possibility to use a distinguishable flashing light on a UAS is to mandate a green one. The requirement has been imposed on the UAS operator rather than on the manufacturer to leave the flexibility to add this type of light to the UA using an add-on kit provided by the manufacturer, to be installed when needed.

— Point UAS.SPEC.060 has been modified to require the remote pilot to be familiar with the user's manual provided by the manufacturer of the UAS.

— A new point UAS.SPEC.085 has been added to define the fixed duration and validity of the operational declaration as being for 2 years.

2.3.6. Additional improvements proposed for the Regulation (EU) 2019/945 (DA)

The following improvements to the DA has been proposed:

— Several recitals, Articles 1, 2, 4, 6, 7, 8, 9, 12, 13, 14, 17 and 30 have been modified to introduce the concept that the market regulation also applies to UAS used in standard scenarios, and two new Parts, 16 and 17, have been added.

— Recital 8 will include a new paragraph (still under development) to clarify that point 1.a of Article 3 of Directive 2014/53/EU (Radio Equipment Directive) does not cover 'the protection of health and safety of persons and of domestic animals and the protection of property' for what concerns the risks related to the flight of the UAS. These risks are more specifically covered by the DA.

— Article 5 has been modified to introduce a new paragraph extending the applicability of Regulation (EU) 2019/1020 to UAS covered by the IA. Regulation 2019/1020 (the enforcement regulation), adopted on 20 June 2019, amends Regulation 765/2008 to strengthen the market surveillance of products covered by the Union harmonisation legislation.

  Article 4 of the new enforcement regulation requires that, for each product placed on the EU market, a responsible economic operator is established in the EU, and it defines the precise obligations on such economic operators. The applicability of this Article is, however, restricted to products that are subject to a limited amount of Union harmonisation legislation, some of which is already applicable to UAS (i.e. the Radio Equipment Directive). However, it is not applicable to the DA, since this act was not ready in time to be included.

— Article 40 has been modified to clarify in the title that it is only applicable to UAS operated in the 'certified' and in the 'specific' categories, except when conducted under a declaration. Moreover, a new paragraph was added to mandate a remote identification system for all UA intended to be operated below 120 m, to address primarily the security and privacy risks. Such a requirement had been extensively discussed during the development of the text of the DA, however, at that time, only the requirement for a 'direct'[29] remote identification system was proposed for UAS to be operated in the 'open' category. It was indeed considered not

[28] https://en.wikipedia.org/wiki/CIE_1931_color_space

[29] The term 'direct' remote identification refers to a system broadcasting a signal that can be directly received by a mobile device (i.e. using Bluetooth or Wi-Fi). On the contrary, a 'network' remote identification is a system that transmits information through a connection with a network (i.e. the Internet). In this case, the receiver does not receive the information directly, but through the network.

proportionate to mandate all UAS (including those operated in the 'specific' category) to be equipped with a 'direct' remote identification system. With the progress of the new regulation on U-space, the requirements for a 'network' remote identification system are being developed. While the 'network' remote identification will be developed mostly to address the safety risk, it may also fit the purpose of addressing the security and privacy risks if the signal may be detected by a mobile device without the need to be connected to a service provider. It was therefore decided to keep the requirement flexible and mandate, for all UAS intended to be operated in populated areas, a remote identification system transmitting data in a way that it can be received by existing mobile devices. This system can be 'direct' or 'network'.

— The term 'data link' used in Parts 1 to 5 has been replaced with the term 'command and control link' to be consistent with the terminology used in aviation.

— The requirements of the 'direct remote identification' in Parts 2 to 4 have been slightly amended to allow additional information to be broadcast, and to include the time stamp.

— The requirement for a green flashing light has been added to Parts 2 to 4 to make it applicable to UAS classes C1, C2 and C3.

— The information to be included in the user's manual defined in Parts 2 to 4 has been updated to clarify that the description of the method for the UA to recover the command and control link needs to be provided, and, in addition, that the procedures to upload the airspace limitations into the geo-awareness system need to be provided.

2.4. What are the expected benefits and drawbacks of the proposals

The impact of standard scenarios was already discussed in the impact assessment published with Opinion No 01/2018.

3. Proposed amendments

The text of the amendment is arranged to show deleted text, new or amended text as shown below:

— deleted text is ~~struck through~~;

— new or amended text is highlighted in grey;

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

3.1. Draft regulation (draft EASA opinion)

3.1.1. Proposed amendment to Regulation (EU) 2019/945 (DA)

COMMISSION REGULATION (EU) No …/..

of XXX

on […]

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to 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 3922/9130, and in particular Article 58 and Article 61 thereof,

Whereas:

(1) The unmanned aircraft systems ('UAS'), whose operation presents a low risk and for which the UAS operator is allowed to submit a declaration based on the standard scenario listed in the Appendix 1 to the Regulation (EU) 2019/947, should not be subject to classic aeronautical compliance procedures. The possibility to establish Community harmonisation legislation as referred to in paragraph 6 of Article 56 of Regulation (EU) 2018/1139 should be used for those UAS. Consequently, it is necessary to set out the requirements that address the risks posed by the operation of those UAS, taking full account of other applicable Union harmonisation legislation.

(2) These requirements should cover the essential requirements provided for in Article 55 of Regulation (EU) 2018/1139, in particular as regards the specific features and functionalities necessary to mitigate risks pertaining to the safety of the flight, privacy, and protection of personal data, security or the environment, arising from the operation of these UAS. They lead

[30] OJ L 212, 22.8.2018, p.1.

to the creation of different classes of UAS characterised by different sets of requirements addressing different level of risks.

(3) When manufacturers place a UAS on the market with the intention to make it available for operations under the conditions of the 'open' category or under an operational declaration and therefore affix a class identification label on it, they should ensure the compliance of the UAS with the requirements of that class.

(4) The measures provided for in this Regulation are based on Opinion No 01/2018[31] issued by the European Union Aviation Safety Agency (EASA) in accordance with Article 65 of Regulation (EU) 2018/1139,

HAS ADOPTED THIS REGULATION:

[NOTE:

In order to simplify the review, for the purpose of the AB consultation only, the text of the amendment is arranged to show deleted text, new or amended text as shown below:

— deleted text is ~~struck through~~;

— new or amended text is highlighted in grey.

The final Opinion will be published without the tracked changes]

Article 1

(1) Recital 1 is replaced by the following:

'(1) The unmanned aircraft systems ('UAS') whose operation presents ~~the lowest risks~~ a low risk and that belong to the 'open' category of operations or for which the UAS operator is allowed to submit a declaration based on the standard scenarios listed in Appendix 1 to Regulation (EU) 2019/947, should not be subject to classic aeronautical compliance procedures. The possibility to establish Community harmonisation legislation as referred to in paragraph 6 of Article 56 of Regulation (EU) 2018/1139 should be used for those UAS. Consequently, it is necessary to set out the requirements that address the risks posed by the operation of those UAS, taking full account of other applicable Union harmonisation legislation.';

(2) recital 2 is replaced by the following:

'(2) These requirements should cover the essential requirements provided for in Article 55 of Regulation (EU) 2018/1139, in particular as regards the specific features and functionalities necessary to mitigate risks pertaining to the safety of the flight, privacy, and protection of personal data, security or the environment, arising from the operation of these UAS. They lead to the creation of several classes of UAS characterised by different sets of requirements addressing different level of risk.';

[31] EASA Opinion No 01/2018 'Introduction of a regulatory framework for the operation of unmanned aircraft systems in the 'open' and 'specific' categories' (RMT.0230), available at https://www.easa.europa.eu/document-library/opinions.

(3) recital 3 is replaced by the following:

'(3) When manufacturers place a UAS on the market with the intention to make it available for operations under the conditions of the 'open' category or under an operational declaration and therefore affix a class identification label on it, they should ensure compliance of the UAS with the requirements of that class.';

(4) recital 8 is replaced by the following:

'(8) Directive 2014/53/EU should apply to unmanned aircraft that are not subject to certification and are not intended to be operated only on frequencies allocated by the Radio Regulations of the International Telecommunication Union for protected aeronautical use, if they intentionally emit and/or receive electromagnetic waves for the purpose of radio communication and/or radio determination at frequencies below 3000 GHz.

[Placeholder for a clarification about applicability of Article 3.1 (a) of Directive 2014/53/EU]'.

(5) recital 10 is replaced by the following:

'(10) Decision No 768/2008/EC of the European Parliament and of the Council sets out common principles and horizontal provisions intended to apply to marketing of products that are subject to relevant sectorial legislation. In order to ensure consistency with other sectorial product legislation, the provisions on the marketing of a UAS ~~intended to be operated in the 'open' category~~ bearing a class identification label should be aligned with the framework established by Decision 768/2008/EC.';

(6) recital 13 is replaced by the following:

'(13) Member States should take the necessary steps to ensure that UAS bearing class identification labels ~~intended to be operated in the 'open' category~~ are made available on the market and put into service only where they do not compromise the health and safety of persons, domestic animals or property, when normally used.';

(7) recital 14 is replaced by the following:

'(14) In order to provide citizens with a high level of environmental protection, it is necessary to limit the noise emissions to the greatest possible extent. Sound power limitations applicable to UAS intended to be operated in the 'open' category might be reviewed ~~in 2022, after evaluation of the first experience with the regulation~~once more information on the impact of the noise produced by these UA becomes available ~~at the end of the transitional periods as defined in Regulation (EU) 2019/947~~.';

(8) recital 16 is replaced by the following:

'(16) In order to ensure a high level of protection of public interest, such as health and safety, and to guarantee fair competition on the Union market, economic operators should be responsible for the compliance of each UAS placed on the market with a class identification label ~~intended to be operated in the 'open' category~~ with the requirements laid down in this Regulation, in relation to their respective roles in the supply and distribution chain. Therefore, it is necessary to provide a clear and proportionate

distribution of obligations, which corresponds to the role of each economic operator in the supply and distribution chain.';

(9) recital 17 is replaced by the following:

'(17) In order to facilitate communication between economic operators, national market surveillance authorities and consumers, economic operators supplying or distributing UAS bearing class identification labels ~~intended to be operated in the 'open' category~~ should provide a website address in addition to the postal address.';

(10) recital 18 is replaced by the following:

'(18) The manufacturer, having detailed knowledge of the design and production process, is best placed to carry out the conformity assessment procedure of a UAS ~~intended to be operated in the 'open' category~~ placed on the market with a class identification label. Conformity assessment should therefore remain solely the obligation of the manufacturer.';

(11) recital 19 is replaced by the following:

'(19) This Regulation should apply to any UAS bearing a class identification label ~~intended to be operated in the 'open' category~~ that is new to the Union market, whether a new UAS made by a manufacturer established in the Union or a new or second-hand UAS imported from a third country.';

(12) recital 20 is replaced by the following:

'(20) It is necessary to ensure that UAS from third countries entering the Union market comply with the requirements of this Regulation if they bear class identification labels ~~are intended to be operated in the 'open' category~~. In particular, it should be ensured that manufacturers carry out appropriate conformity assessment procedures. Provision should therefore be made for importers to make sure that the UAS they place on the market comply with the requirements of this Regulation and that they do not place on the market UAS which do not comply with these requirements or present a risk. Provision should also be made for importers to make sure that the conformity assessment procedures have been carried out and that the CE marking and technical documentation drawn up by the manufacturers is available for inspection by the competent national authorities.';

(13) recital 21 is replaced by the following:

'(21) The distributor who makes a UAS bearing a class identification label ~~intended to be operated in the 'open' category~~ available on the market should act with due care to ensure that its handling of the product does not adversely affect its compliance. Both importers and distributors are expected to act with due care in relation to the requirements applicable when placing or making products available on the market.';

(14) recital 22 is replaced by the following:

'(22) When placing on the market a UAS bearing a class identification label ~~intended to be operated in the 'open' category~~, every importer should indicate on the UAS his name, registered trade name or registered trademark and the address at which he can be

contacted. Exceptions should be provided for cases where the size of the UAS does not allow this. This includes cases where the importer would have to open the packaging to put his name and address on the UAS.';

(15) recital 23 is replaced by the following:

'(23) Any economic operator that either places a UAS bearing a class identification label ~~intended to be operated in the 'open' category~~ on the market under his own name or trademark, or modifies a UAS bearing a class identification label ~~intended to be operated in the 'open' category~~ in such a way that compliance with the applicable requirements may be affected, should be considered to be the manufacturer and should assume the obligations of the manufacturer.';

(16) recital 24 is replaced by the following:

'(24) Distributors and importers, being close to the market place, should be involved in market surveillance tasks carried out by the competent national authorities, and should be prepared to participate actively, providing those authorities with all the necessary information relating to ~~the~~ UAS bearing class identification labels ~~intended to be operated in the 'open' category~~.';

(17) recital 25 is replaced by the following:

'(25) Ensuring the traceability of a UAS placed on the market with a class identification label ~~intended to be operated in the 'open' category~~ throughout the whole supply chain helps to make market surveillance simpler and more efficient. An efficient traceability system facilitates the market surveillance authorities' task of tracing economic operators who make non-compliant UAS available on the market.';

(18) recital 26 is replaced by the following:

'(26) This Regulation should be limited to the setting out of the essential requirements. In order to facilitate the assessment of conformity of each UAS bearing a class identification label ~~intended to be operated in the 'open' category~~ with those requirements, it is necessary to provide for a presumption of conformity for products, which are in conformity with harmonised standards that are adopted in accordance with Regulation (EU) No 1025/2012 of the European Parliament and of the Council for the purpose of setting out detailed technical specifications of those requirements.';

(19) recital 27 is replaced by the following:

'(27) The essential requirements applicable to a UAS bearing a class identification label ~~intended to be operated in the 'open' category~~ should be worded precisely enough to create legally binding obligations. They should be formulated so as to make it possible to assess conformity with them even in the absence of harmonised standards or where the manufacturer chooses not to apply a harmonised standard.';

(20) recital 28 is replaced by the following:

'(28) Regulation (EU) No 1025/2012 provides for a procedure for objections to harmonised standards where those standards do not entirely satisfy the requirements of the harmonisation legislation applicable to a UAS placed on the market with a class

identification label ~~intended to be operated in the 'open' category~~ under this Regulation. This procedure should apply where appropriate in relation to standards which reference have been published in the Official Journal as providing presumption of conformity with the requirements laid down in this Regulation.';

(21) recital 29 is replaced by the following:

'(29) To enable economic operators to demonstrate and the competent authorities to ensure that each UAS ~~intended to be operated in the 'open' category~~ made available on the market with a class identification label ~~comply~~ complies with the essential requirements of its class, it is necessary to provide for conformity assessment procedures. Decision No 768/2008/EC sets out modules for conformity assessment procedures, which include procedures from the least to the most stringent, in proportion to the level of risk involved and the level of safety required. In order to ensure inter-sectorial coherence and to avoid ad hoc variants of conformity assessment, conformity assessment procedures should be chosen from among those modules.';

(22) recital 30 is replaced by the following:

'(30) Market surveillance authorities and UAS operators should have easy access to the EU declaration of conformity. In order to fulfil this requirement, manufacturers should ensure that each UAS placed on the market with a class identification label ~~intended to be operated in the 'open' category~~ is accompanied either by a copy of the EU declaration of conformity or by the internet address at which the EU declaration of conformity can be accessed.';

(23) recital 31 is replaced by the following:

'(31) To ensure effective access to information for market surveillance purposes, the information required to identify all the applicable Union acts for a UAS ~~intended to be operated in the 'open' category~~ placed on the market with a class identification label should be available in a single EU declaration of conformity. In order to reduce the administrative burden on economic operators, it should be possible for that single EU declaration of conformity to be a dossier made up of relevant individual declarations of conformity.';

(24) recital 32 is replaced by the following:

'(32) The CE marking indicating the conformity of a product is the visible consequence of a whole process of conformity assessment in the broad sense. The general principles governing the CE marking are set out in Regulation (EC) No 765/2008 of the European Parliament and of the Council. The ~~Rules~~ rules governing the affixing of the CE marking to a UAS bearing a class identification label ~~intended to be operated in the 'open' category~~ should be laid out in this Regulation.';

(25) recital 33 is replaced by the following:

'(33) Some UAS classes ~~intended to be operated in the 'open' category~~ covered by this Regulation require the intervention of conformity assessment bodies. Member States should notify the Commission of these.';

(26) recital 34 is replaced by the following:

'(34) It is necessary to ensure a uniformly high level of performance of bodies performing conformity assessments of UAS bearing class identification labels ~~intended to be operated in the 'open' category~~ throughout the Union, and that all such bodies perform their functions at the same level and under conditions of fair competition. Therefore, obligatory requirements should be set for conformity assessment bodies wishing to be notified in order to provide conformity assessment services.';

(27) recital 35 is replaced by the following:

'(35) If a conformity assessment body demonstrates the conformity of a UAS bearing a class identification label ~~intended to be operated in the 'open' category~~ with the criteria laid down in harmonised standards, it should be presumed to comply with the corresponding requirements set out in this Regulation.';

(28) recital 39 is replaced by the following:

'(39) Conformity assessment bodies frequently subcontract parts of their activities linked to the assessment of conformity or have recourse to a subsidiary. In order to safeguard the level of protection required for the UAS bearing class identification labels ~~intended to be operated in the 'open' category~~ to be placed on the Union market, it is essential that conformity assessment subcontractors and subsidiaries fulfil the same requirements as notified bodies do in relation to the performance of conformity assessment tasks. Therefore, it is important that the assessment of the competence and performance of bodies to be notified, and the monitoring of bodies already notified, also cover activities carried out by subcontractors and subsidiaries.';

(29) recital 44 is replaced by the following:

'(44) Manufacturers should take all appropriate measures to ensure that UAS bearing a class identification label ~~intended to be operated in the 'open' category~~ may be placed on the market only if, when properly stored and used for their intended purpose or under conditions, which can be reasonably foreseen, it does not endanger people's health or safety. UAS bearing a class identification label ~~intended to be operated in the 'open' category~~ should be considered as non-compliant with the essential requirements set out in this Regulation only under conditions of use which can be reasonably foreseen, that is when such use could result from lawful and readily predictable human behaviour.';

(30) recital 45 is replaced by the following:

'(45) In order to ensure legal certainty, it is necessary to clarify that the rules on Union market surveillance and control of products entering the Union market provided for in Regulation (EC) No 765/2008, including the provisions regarding the exchange of information through the Rapid Alert System (RAPEX), apply to each UAS placed on the market with a class identification label ~~intended to be operated in the 'open' category~~. This Regulation should not prevent Member States from choosing the competent authorities to carry out those tasks. In order to ensure a smooth transition as regards the implementation of this Regulation, appropriate transitional measures should be provided.';

(31) recital 47 is replaced by the following:

'(47) Each UAS placed on the market ~~and intended to be operated in the 'open' category and bearing~~ with a class identification label should comply with the certification requirements for UAS operated in the 'specific' or 'certified' categories of operations, as applicable, if ~~those~~ the UAS ~~are~~ is used outside the 'open' category of operations or the standard scenarios defined in Appendix I to Regulation (EU) 2019/947.';

(32) Paragraph 2 of Article 1 is replaced by the following.

'2 It also establishes rules on making UAS ~~intended for use in the 'open' category~~ bearing class identification labels and with remote identification add-ons available on the market and on their free movement in the Union.';

(33) Paragraphs 1 and 2 of Article 2 are replaced by the following.

'1. Chapter II of this Regulation applies to the following products:

(a) UAS intended to be operated under the rules and conditions applicable to the 'open' category of UAS operations or under operational declarations in the 'specific' category of UAS operations pursuant to Regulation (EU) 2019/947, except privately built UAS, and bearing a class identification label as set out in Parts 1 to 5, 16 and 17 of the Annex to this Regulation indicating to which of the ~~five~~ seven UAS classes referred to in Regulation (EU) 2019/947 it belongs;

(b) remote identification add-ons as set out in Part 6 of the Annex to this Regulation.

2. Chapter III of this Regulation applies to UAS operated under the rules and conditions applicable to the 'certified' and 'specific' categories of UAS operations pursuant to Regulation (EU) 2019/947 except when conducted under a declaration.'

(34) Title of Chapter II is replaced by the following:

'UAS intended to be operated in the 'open' category or in the 'specific' category under operational declarations and with remote identification add-ons';

(35) Article 4 is replaced by the following.

'1. The products referred to in paragraph 1 of Article 2 shall meet the requirements set out in Parts 1 to 6, 16 and 17 of the Annex.

2. UAS that are not toys within the meaning of Directive 2009/48/EC shall comply with the relevant health and safety requirements set out in Directive 2006/42/EC only in relation to risks other than those linked to the safety of the UA flight.

3. Any updates of software of the products that have already been made available on the market may be made only if such updates do not affect the compliance of the product.';

(36) the following paragraph 3 to Article 5 is inserted:

'3. Paragraphs 1 to 4 of Article 4 of Regulation (EU) 2019/1020 of the European Parliament and of the Council shall apply as from 16 July 2021.';

(37) paragraph 1 of Article 6 is replaced by the following.

'1. When placing their product on the Union market, manufacturers shall ensure that it has been designed and manufactured in compliance with the requirements set out in Parts 1 to 6, 16 and 17 of the Annex.';

(38) paragraph 2 of Article 6 is replaced by the following.

'2. Manufacturers shall draw up the technical documentation provided for in Article 17 and carry out the relevant conformity assessment procedure referred to in Article 13 or have it outsourced.

Where compliance of the product with the requirements set out in Parts 1 to 6, 16 and 17 of the Annex has been demonstrated by that conformity assessment procedure, manufacturers shall draw up an EU declaration of conformity and affix the CE marking.';

(39) paragraph 5 of Article 6 is replaced by the following.

'5. Manufacturers of UAS shall ensure that the UA bears a type within the meaning of Decision 768/2008/EC and a unique serial number allowing for its identification, and if applicable, compliant with the requirements defined in the corresponding Parts 2 to 4, 16 and 17 of the Annex . Manufacturers of remote identification add-ons shall ensure that the remote identification add-on bears a type and a unique serial number allowing for their identification and compliant with the requirements defined in Part 6 of the Annex. In both cases, manufacturers shall ensure that a unique serial number is also affixed to the EU declaration of conformity or to the simplified EU declaration of conformity referred to in Article 14.';

(40) paragraph 7 of Article 6 is replaced by the following.

'7. Manufacturers shall ensure that the product is accompanied by the manual and information notice required by Parts 1 to 6, 16 and 17 of the Annex in a language which can be easily understood by consumers and other end users, as determined by the Member State concerned. Such manual and information notice, as well as any labelling, shall be clear, understandable and legible.';

(41) paragraph 2 of Article 8 is replaced by the following.

'2. Before placing a product on the Union market, importers shall ensure that:

(a) the appropriate conformity assessment procedure referred to in Article 13 has been carried out by the manufacturer;

(b) the manufacturer has drawn up the technical documentation referred to in Article 17;

(c) the product bears the CE marking and, when required, the UA class identification label and the indication of the sound power level;

(d) the product is accompanied by the documents referred to in paragraph 7 and 8 of Article 6;

(e) the manufacturer has complied with the requirements set out in paragraphs 5 and 6 of Article 6.

Where an importer considers or has reasons to believe that a product is not in conformity with the requirements set out in Parts 1 to 6, 16 and 17 of the Annex, he shall not place the product on the market until it has been brought into conformity. Furthermore, where the product presents a risk for the health and safety of consumers and third parties, the importer shall inform the manufacturer and the competent national authorities to that effect.';

(42) paragraph 4 of Article 8 is replaced by the following.

'4. Importers shall ensure that the product is accompanied by the manual and information notice required by Parts 1 to 6, 16 and 17 of the Annex in a language which can be easily understood by consumers and other end users, as determined by the Member State concerned. That manual and information notice, as well as any labelling, shall be clear, understandable and legible.';

(43) paragraph 2 of Article 9 is replaced by the following.

'2. Before making a product available on the market, distributors shall verify that the product bears the CE marking and, when applicable, the UA class identification label and the indication of the sound power level, is accompanied by the documents referred to in paragraphs 7 and 8 of Article 6 and that the manufacturer and the importer have complied with the requirements set out in paragraphs 5 and 6 of Article 6 and in paragraph 3 of Article 8.

Distributors shall ensure that the product is accompanied by the manual and information notice required by Parts 1 to 6, 16 and 17 of the Annex in a language which can be easily understood by consumers and other end users, as determined by the Member State concerned. That manual and information notice, as well as any labelling, shall be clear, understandable and legible.

Where a distributor considers or has reason to believe that a product is not in conformity with the requirements set out in Article 4, he shall not make the product available on the market until it has been brought into conformity. Furthermore, where the product presents a risk, the distributor shall inform the manufacturer or the importer to that effect, as well as the competent market surveillance authorities.';

(44) Article 12 is replaced by the following.

'A product which is in conformity with harmonised standards or parts thereof, the references of which have been published in the Official Journal of the European Union, shall be presumed to be in conformity with the requirements covered by those standards or parts thereof set out in Parts 1 to 6, 16 and 17 of the Annex.';

(45) paragraph 1 of Article 13 is replaced by the following.

'1. The manufacturer shall perform a conformity assessment of the product using one of the following procedures with a view to establishing its compliance with the requirements set out in Parts 1 to 6, 16 and 17 of the Annex. The conformity assessment shall take into account all intended and foreseeable operating conditions.';

(46) paragraph 1 of Article 14 is replaced by the following.

'1. The EU declaration of conformity referred to in paragraph 8 of Article 6 shall state that compliance of the product with the requirements set out in Parts 1 to 6, 16 and 17 of the Annex has been demonstrated and, for UAS, identify its class.';

(47) Paragraph 2 of Article 16 to be replaced by the followings.

'2. The UA class identification label shall be affixed visibly, legibly and indelibly to the UA or, when relevant, the class C5 accessories, and its packaging and shall be at least 5 mm high. The affixing to a product of markings, signs or inscriptions which are likely to mislead third parties regarding the meaning or form of the class identification label shall be prohibited.';

(48) paragraph 1 of Article 17 is replaced by the following.

'1. The technical documentation shall contain all relevant data and details of the means used by the manufacturer to ensure that the product complies with the requirements set out in Parts 1 to 6, 16 and 17 of the Annex. It shall, at least, contain the elements set out in Part 10 of the Annex.';

(49) paragraph 4 of Article 17 is replaced by the following.

'4. Where the technical documentation does not comply with paragraphs 1, 2 or 3 of this Article, the market surveillance authority may ask the manufacturer or the importer to have a test performed by a body acceptable to the market surveillance authority at the expense of the manufacturer or the importer within a specified period in order to verify compliance of the product with the requirements set out in Parts 1 to 6, 16 and 17 of the Annex which applies to it.';

(50) paragraph 3 of Article 30 is replaced by the following.

'3. Where a notified body finds that the requirements set out in Parts 1 to 6, 16 and 17 of the Annex or in corresponding harmonised standards or other technical specifications have not been met by a manufacturer, it shall require the manufacturer to take appropriate corrective measures and shall not issue an EU-type examination certificate or a quality system approval.';

(51) paragraph 1 of Article 36 is replaced as follows.

'1. Where the market surveillance authorities of one Member State ~~have taken action pursuant to Article 20 of Regulation (EC) No 765/2008, or where they~~ or where they have sufficient reason to believe that a product presents a risk to the health or safety of persons or to other aspects of public interest protection covered by this Chapter, they shall carry out an evaluation in relation to the product concerned, covering all applicable requirements laid down in this Chapter. The relevant economic operators shall cooperate as necessary with the market surveillance authorities for that purpose.

Where, in the course of the evaluation referred to in the first subparagraph, the market surveillance authorities find that the product does not comply with the requirements laid down in this Chapter, they shall, without delay, require the relevant economic operator to take all appropriate corrective actions to bring the product into compliance with those

requirements, to withdraw the product from the market, or to recall it within a reasonable period, commensurate with the nature of the risk, as they may prescribe.

The market surveillance authorities shall inform the relevant notified body accordingly.

Article 21 of Regulation (EC) No 765/2008 shall apply to the measures referred to in the second subparagraph of this paragraph.';

(52) the title of Chapter III and Article 40 is replaced by the following.

'Requirements for UAS operated in the 'certified' category and in the 'specific' category except when conducted under a declaration'.;

(53) Article 40 is replaced as follows:

'Requirements for UAS operated in the 'certified' and 'specific' categories except when conducted under a declaration

1. The design, production and maintenance of UAS shall be certified if the UAS meets any of the following conditions:

   (a) it has a characteristic dimension of 3 m or more, and is designed to be operated over assemblies of people;

   (b) it is designed for transporting people;

   (c) it is designed for the purpose of transporting dangerous goods and requiring a high level of robustness to mitigate the risks for third parties in case of accident;

   (d) it is used in the 'specific' category of operations defined in Article 5 of Regulation (EU) 2019/947 and the operational authorisation issued by the competent authority, following a risk assessment provided for in Article 11 of Regulation (EU)2019/947, considers that the risk of the operation cannot be adequately mitigated without the certification of the UAS.

2. A UAS subject to certification shall comply with the applicable requirements set out in Commission Regulation (EU) No 748/2012, Commission Regulation (EU) No 640/2015 and Commission Regulation (EU) No 1321/2014.

3. Unless it needs to be certified in accordance with paragraph 1, a UAS used in the 'specific' category shall feature the technical capabilities set out in the operational authorisation issued by the competent authority ~~or in the standard scenario defined in Appendix 1 to the Annex of Regulation (EU) 2019/947~~ or as defined by the Light UAS Operator Certificate (LUC) pursuant to Part C of the Annex of Implementing Regulation (EU) 2019/947.

4. Each UA intended to be operated in VLL shall be equipped with a remote identification system that ensures, in real time during the whole duration of the flight, the periodic transmission of at least the following data, in a way that they can be received by existing mobile devices:

   (i) the UAS operator registration number;

(ii) the unique physical serial number of the UA compliant with Standard ANSI/CTA-2063 unless the UA is privately built;

(iii) the timestamp, the geographical position of the UA and its height above the surface or take-off point;

(iv) the route course measured clockwise from true north and the ground speed of the UA; and

(v) the geographical position of the remote pilot or, if not available, the take-off point.';

(54) paragraph 4 of part 1 of the Annex is replaced by the following:

'(4) be safely controllable with regards to stability, manoeuvrability and ~~data~~ the command and control link performance, by a remote pilot following the manufacturer's instructions, as necessary under all anticipated operating conditions including following the failure of one or, if appropriate, more systems;';

(55) paragraph (8)(a) of part 1 of the Annex is replaced by the following:

'(a) the characteristics of the UA including but not limited to the:

— UA class

— UA mass (with a description of the reference configuration) and the maximum take-off mass (MTOM);

— general characteristics of allowed payloads in terms of mass, dimensions, interfaces with the UA and other possible restrictions;

— equipment and software to control the UA remotely; and

— a description of the behaviour of the UA in case of a loss of ~~data~~ the command and control link;';

(56) paragraph 4 of part 2 of the Annex is replaced by the following:

'(4) be safely controllable with regards to stability, manoeuvrability and ~~data~~ the command and control link performance, by a remote pilot following the manufacturer's instructions, as necessary under all anticipated operating conditions including following the failure of one or, if appropriate, more systems;';

(57) Paragraph 7 of part 2 of the Annex is replaced by the following:

'(7) in case of a loss of the~~data~~ command and control link, have a reliable and predictable method for the UA to recover the ~~data~~ command and control link or terminate the flight in a way that reduces the effect on third parties in the air or on the ground;'

(58) Paragraph 12(b) of part 2 of the Annex is amended as the following:

'(b) ensures, in real time during the whole duration of the flight, the direct periodic broadcast from the UA using an open and documented transmission protocol, at least of the following data, in a way that they can be received directly by existing mobile devices within the broadcasting range:

i the UAS operator registration number;

ii the unique physical serial number of the UA compliant with standard ANSI/CTA-2063;

iii the time stamp, the geographical position of the UA and its height above the surface or take-off point;

iv the route course measured clockwise from true north and ground speed of the UA; and

v the geographical position of the remote pilot or, if not available, the take-off point.';

(59) paragraph 16 of part 2 of the Annex is replaced by the following:

'(16) be equipped ~~with lights for the purpose of~~:

(a) with lights for the purpose of controllability of the UA; and

(b) with at least one green flashing light for the purpose of conspicuity of the UA at night to ~~the design of the lights shall~~ allow a person on the ground to distinguish the UA from a manned aircraft;';

(60) paragraph 18 (a) of part 2 of the Annex is replaced by the following:

'(a) the characteristics of the UA including but not limited to the:

— class of the UA;

— UA mass (with a description of the reference configuration) and the maximum take-off mass (MTOM);

— general characteristics of allowed payloads in terms of mass, dimensions, interfaces of with the UA and other possible restrictions;

— equipment and software to control the UA remotely;

— reference of the transmission protocol used for the direct remote identification emission;

— sound power level;

— ~~and a~~ description of the behaviour of the UA in case of a loss of the command and control link, ~~in case of a loss of data link~~ and the method to recover the UA;' and

— the procedures to upload the airspace limitations into the geo-awareness system;'

(61) paragraph 3 of part 3 of the Annex is replaced by the following:

'(4) be safely controllable with regards to stability, manoeuvrability and ~~data~~ the command and control link performance, by a remote pilot with adequate competency as defined in Implementing Regulation (EU) 2019/947 and following the manufacturer's instructions, as necessary under all anticipated operating conditions including following the failure of one or, if appropriate, more systems;';

(62) paragraph 7 of part 3 of the Annex is replaced by the following:

'(7) unless tethered, in case of a loss of ~~data~~ the command and control link, have a reliable and predictable method for the UA to recover the ~~data~~ command and control link or terminate the flight in a way that reduces the effect on third parties in the air or on the ground;';

(63) paragraph 8 of part 3 of the Annex is replaced by the following:

'(8) unless tethered, be equipped with a data command and control link protected against unauthorised access to the command and control functions;';

(64) point (b) of paragraph 14(b) of part 3 of the Annex is replaced by the following:

'(b) ensures, in real time during the whole duration of the flight, the direct periodic broadcast from the UA using an open and documented transmission protocol, at least of the following data, in a way that they can be received directly by existing mobile devices within the broadcasting range:

i the UAS operator registration number;

ii the unique physical serial number of the UA compliant with standard ANSI/CTA-2063;

iii the time stamp, the geographical position of the UA and its height above the surface or take-off point;

iv the route course measured clockwise from true north and ground speed of the UA; and

v the geographical position of the remote pilot or, if not available, the take-off point.';

(65) paragraph 18 of part 3 of the Annex is replaced by the following:

'(18) be equipped ~~with lights for the purpose of~~:

(c) with lights for the purpose of controllability of the UA; and

(d) with at least one green flashing light for the purpose of conspicuity of the UA at night to ~~the design of the lights shall~~ allow a person on the ground, to distinguish the UA from a manned aircraft;';

(66) paragraph 19 (a) of part 3 of the Annex is replaced by the following:

'(a) the characteristics of the UA including but not limited to the:

— class of the UA;

— UA mass (with a description of the reference configuration) and the maximum take-off mass (MTOM);

— general characteristics of allowed payloads in terms of mass, dimensions, interfaces of with the UA and other possible restrictions;

— equipment and software to control the UA remotely;

— reference of the transmission protocol used for the direct remote identification emission;

— sound power level;

— ~~and a~~ description of the behaviour of the UA in case of a loss of the command and control link, ~~in case of a loss of data link~~ and the method to recover the UA;' and

— the procedures to upload the airspace limitations into the geo-awareness system;';

(67) paragraph 3 of part 4 of the Annex is replaced by the following:

'(3) be safely controllable with regards to stability, manoeuvrability and ~~data~~ the command and control link performance, by a remote pilot with adequate competency as defined in Implementing Regulation (EU) 2019/947 and following the manufacturer's instructions, as necessary under all anticipated operating conditions including following the failure of one or, if appropriate, more systems;';

(68) paragraph 5 of part 4 of the Annex is replaced by the following:

'(5) unless tethered, in case of a loss of ~~data~~ the command and control link, have a reliable and predictable method for the UA to recover the ~~data~~ command and control link or terminate the flight in a way that reduces the effect on third parties in the air or on the ground;';

(69) paragraph 9(b) of part 4 of the Annex is replaced by the following:

'(b) ensures, in real time during the whole duration of the flight, the direct periodic broadcast from the UA using an open and documented transmission protocol, at least of the following data, in a way that they can be received directly by existing mobile devices within the broadcasting range:

i the UAS operator registration number;

ii the unique physical serial number of the UA compliant with standard ANSI/CTA-2063;

iii the time stamp, the geographical position of the UA and its height above the surface or take-off point;

iv the route course measured clockwise from true north and ground speed of the UA; and

v the geographical position of the remote pilot or, if not available, the take-off point.';

(70) paragraph 12 of part 4 of the Annex is replaced by the following:

'(12) unless tethered, be equipped with a ~~data~~ command and control link protected against unauthorised access to the command and control functions;';

(71) paragraph 14 of part 4 of the Annex is replaced by the following:

'(14) be equipped ~~with lights for the purpose of~~:

(a) with lights for the purpose of controllability of the UA; and

(b) with at least one green flashing light for the purpose of conspicuity of the UA at night to ~~the design of the lights shall~~ allow a person on the ground to distinguish the UA from a manned aircraft;';

(72) paragraph 15 (a) of part 4 of the Annex is replaced by the following:

'(a) the characteristics of the UA including but not limited to the:

— class of the UA;

— UA mass (with a description of the reference configuration) and the maximum take-off mass (MTOM);

— general characteristics of allowed payloads in terms of mass, dimensions, interfaces with the UA and other possible restrictions;

— equipment and software to control the UA remotely;

— reference of the transmission protocol used for the direct remote identification emission;

— sound power level;

— ~~and a~~ description of the behaviour of the UA in case of a loss of the command and control link, ~~in case of a loss of data link~~ and the method to recover the UA;' and

— the procedures to upload the airspace limitations into the geo-awareness system;';

(73) paragraph 4 (a) of part 5 of the Annex is replaced by the following:

'(a) the characteristics of the UA including but not limited to the:

— class of the UA;

— UA mass (with a description of the reference configuration) and the maximum take-off mass (MTOM);

— general characteristics of allowed payloads in terms of mass dimensions, interfaces of with the UA and other possible restrictions;

— equipment and software to control the UA remotely; ~~and~~

— and a description of the behaviour of the UA in case of a loss of ~~data~~ the command and control link;';

(74) paragraph 3 of part 6 of the Annex is replaced by the following:

'(3) ensures, in real time during the whole duration of the flight, the direct periodic broadcast from the UA using an open and documented transmission protocol, at least of the following data, in a way that they can be received directly by existing mobile devices within the broadcasting range:

i the UAS operator registration number;

ii the unique physical serial number of the UA compliant with standard ANSI/CTA-2063;

iii the time stamp, the geographical position of the UA and its height above the surface or take-off point;

iv the route course measured clockwise from true north and ground speed of the UA; and

v the geographical position of the remote pilot or, if not available, the take-off point.';

(75) paragraph 1 of Part 8 Module B is replaced by the following.

'1. EU-type examination is the part of a conformity assessment procedure in which a notified body examines the technical design of the product and verifies and attests that the technical design of the product meets the applicable requirements set out in Parts 1 to 6, 16 and 17.';

(76) paragraph 1 of Part 9 is replaced by following:

'1. Conformity based on full quality assurance is the conformity assessment procedure whereby the manufacturer fulfils the obligations set out in points 2 and 5, and ensures and declares on his sole responsibility that the product concerned satisfies the applicable requirements set out in Parts 1 to 6, 16 and 17.';

(77) paragraph 4 of Part 11 is replaced by following:

'4. Object of the declaration [*identification of the product allowing traceability; it may include a colour image of sufficient resolution where necessary for the identification of the products; in case of a kit of accessories indicate the type of UAS to which the kit ensures the conversion*].';

(78) paragraph 5 of Part 11 is replaced by following:

'5. The object of the declaration described above is of class … *[include for UAS the class number as defined by Parts 1 to 5, 16 and 17 of this annex; for a kit of accessories indicate the class into which the UAS is converted].';*

(79) a new Part 16 and Part 17 are added according to the Annex to this Regulation.

Article 2

This Regulation shall enter into force on the 20th day following that of its publication in the *Official Journal of the European Union*.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels,

For the Commission

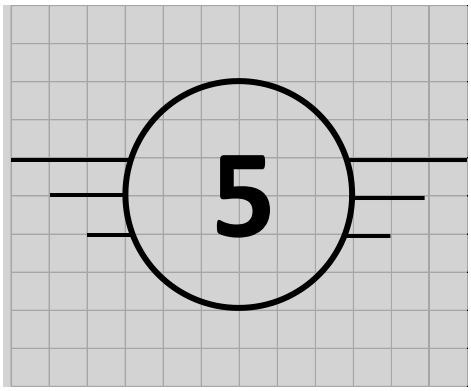
The President

Annex 1

Part 16

Requirements for a class C5 Unmanned aircraft system and C5 accessories

A class C5 UAS bears the following class identification label on the UA:



A class C5 UAS shall comply with the requirements defined in Part 4, except points (2) and (10). In addition, it shall comply with the following:

(1) be a rotorcraft or a tethered aircraft other than a fixed-wing aircraft;

(2) if it is equipped with a geo-awareness function, it shall comply with point (10) of Part 4;

(3) during flight provide the remote pilot with clear and concise information on the height of the UA above the surface or take-off point;

(4) unless tethered, be equipped with a low-speed mode selectable by the remote pilot and limiting the ground speed to not more than 5 m/s;

(5) unless tethered, provide means for the remote pilot to terminate the flight of the UA, which shall:

(a) be reliable, predictable and independent from the automatic flight control and guidance system; this applies also to the activation of this means;

(b) force the descent of the UA and prevent its powered horizontal displacement; and

(c) include means to reduce the effect of the UA impact dynamics;

(6) unless tethered, provide the remote pilot with means to continuously monitor the signal strength of the command and control link and receive an alert from the UAS when it is likely that the signal is going to be lost, and another alert when the signal is lost; and

(7) in addition to the information indicated in point (15)(a) of Part 4, include in the user's manual a description of the means to terminate the flight.

A class C5 UAS may consist in a UAS class C3 fitted with accessories ensuring the conversion of the UAS into a class C5 UAS. In this case, the class C5 label is affixed on the accessories.

In order to be eligible for the conversion to a UAS class C5, the UAS class C3 shall comply with (1) and provide the necessary interfaces to the accessories.

The accessories shall be easy to install by a UAS operator on a UAS class C3 following the instructions provided by the manufacturer of the accessories.

The accessories may be placed on the market independently from the class C3 UAS which they ensure the conversion. In this case, the manufacturer of the accessories shall place on the market a single conversion kit that shall:

(a) not alter the compliance of the C3 UAS with requirements of Part 4;

(b) ensure compliance of the UAS equipped with the kit with all additional requirements defined in this Part with exception of point 3;

(c) ensure that the UAS cannot be operated when one element of the kit is not properly installed;

(d) be accompanied by a user's manual providing:

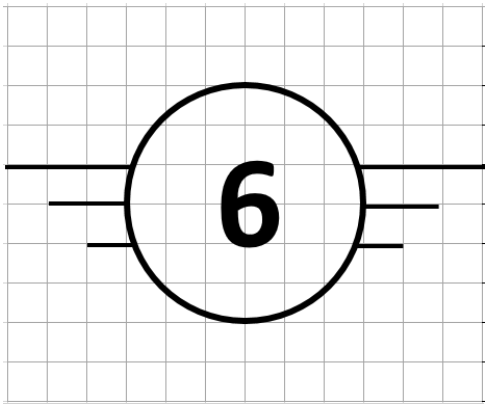
(i) the list of all UAS class C3 where the kit can be applied;

(ii) instructions on how to install and operate the kit

Part 17

Requirements for a class C6 Unmanned aircraft system

A class C6 UAS bears the following class identification label on the UA:



A class C6 UAS shall comply with the requirements defined in Part 4, except points (2) and (10). In addition, it shall comply with the following:

(1) the UA shall have a maximum ground speed in level flight of not more than 50 m/s;

(2) if it is equipped with a geo-awareness function, it shall comply with point (10) of Part 4;

(3) during flight provide the remote pilot with clear and concise information on the geographical position of the UA, its speed and its height above the surface or take-off point;

(4) provide means to prevent the UA from breaching the horizontal and vertical limits of a programmable flight volume;

(5) unless tethered, provide means for the remote pilot to terminate the flight of the UA, which shall:

(a) be reliable, predictable and independent from the automatic flight control and guidance system; this applies also to the activation of this means; and

(b) force the descent of the UA and prevent its powered horizontal displacement;

(6) provide means to programme the UA trajectory;

(7) unless tethered, provide the remote pilot with means to continuously monitor the signal strength of the command and control link and receive an alert from the UAS when it is likely that the signal is going to be lost and when the signal is lost; and

(8) in addition to the information indicated in point (15)(a) of Part 4, include in the user's manual:

(a) a description of the means to terminate the flight;

(b) a description of the function that limits the access of the UA to certain airspace areas or volumes; and

(c) the distance most likely to be travelled by the UA after activation of the means of point (5), to be considered by the UAS operator when defining the ground risk buffer.

3.1.2. Proposed amendment to Regulation (EU) 2019/947 (IA)

COMMISSION REGULATION (EU) No …/..

of XXX

on […]

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EU) 2018/1139 of the European Parliament and of the Council 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 216/2008 and (EC) No 552/2004 , and in particular Article 57 thereof,

Whereas:

(1) Regulation (EU) 2019/947 includes Appendix 1 as a provision for standard scenarios supporting a declaration.

(2) Two standard scenarios have been developed by EASA, based on the experience gained by some Member States. Standard scenario 1 (STS-01) covers operations in VLOS, at a maximum height of 120 m over a controlled ground area in a populated environment using a CE class C5 UAS. Standard scenario 2 (STS-02) covers operations that might be in BVLOS, with the UA at a distance of not more than 2 km from the remote pilot if visual observers are used, at a maximum height of 120 m over a controlled ground area in a sparsely populated environment, and using a CE class C6 UAS. The measures provided for in this Regulation are in accordance with the opinion of the committee established in accordance with Article 127 of Regulation (EU) 2018/1139,

HAS ADOPTED THIS REGULATION:

[NOTE:

In order to simplify the review, for the purpose of the AB consultation only, the text of the amendment is arranged to show deleted text, new or amended text as shown below:

— deleted text is ~~struck through~~;

— new or amended text is highlighted in grey.

The final Opinion will be published without the tracked changes]

Article 1

(1) Point (18) of Article 2 is replaced by the following:

'(18) 'involved persons' means persons who participate in the UAS operation and who are aware of the instructions and safety precautions given by the UAS operator; ~~'uninvolved persons' means persons who are not participating in the UAS operation or who are not aware of the instructions and safety precautions given by the UAS operator;'~~;

(2) the following point (24) is inserted into Article 2:

'(24) 'unmanned aircraft observer' means a person, situated alongside the remote pilot, who, by unaided visual observation of the UA, assists the remote pilot in keeping the UA in VLOS and safely conducting the flight;';

(3) the following point (25) of Article 2 is inserted:

'(25) 'visual observer' means a person who assists the remote pilot by performing unaided visual scanning of the airspace in which the unmanned aircraft is operating for any potential hazard in the air;';

(4) the following point (26) of Article 2 is inserted:

'(26) 'flight geography' means the volume(s) of airspace defined spatially and temporally in which the UAS operator plans to conduct the operation under normal procedures.';

(5) the following point (27) of Article 2 is inserted:

'(27) 'flight geography area' means the projection of the flight geography on the surface of the earth.';

(6) the following point (28) of Article 2 is inserted:

'(28) 'contingency volume' means the volume outside the flight geography where contingency procedures are applied.';

(7) the following point (29) of Article 2 is inserted:

'(29) 'contingency area' means the projection of the contingency volume on the surface of the earth;';

(8) the following point (30) of Article 2 is inserted:

'(30) 'operational volume' is the combination of the flight geography and the contingency volume;';

(9) the following point (31) of Article 2 is inserted:

'(31) ground risk buffer' is an area over the surface of the earth, which surrounds the operational volume and that is defined to minimise the risk to third parties on the surface in the event of the unmanned aircraft leaving the operational volume.';

(10) paragraph 5 of Article 5 is replaced by the following

'5. Where the UAS operator submits a declaration to the competent authority of the Member State of registration in accordance with point UAS.SPEC.020 laid down in Part B of the Annex for an operation complying with a standard scenario as defined in Appendix

1 to that Annex, the UAS operator shall not be required to obtain an operational authorisation in accordance with paragraphs 1 to 4 of this Article, and the procedure laid down in paragraph 5 of Article 12 shall apply. The UAS operator shall use the declaration referred to in Appendix 2 to that Annex.';

(11) Article 23 is replaced by the following:

'1. This Regulation shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

It shall apply from 1 July 2020.

2. Paragraph 5 of article 5 shall apply from [*OP: please insert 18 months after the entry into force of this Regulation- i.e. June 2022*]

3. Notwithstanding paragraph 1 of Article 21, Member States may, in accordance with paragraph 5 of Article 5, accept declarations made by UAS operators based on national standard scenarios or the equivalent, if those scenarios meet the requirements of point UAS.SPEC.020 of the Annex, until [*OP: please insert 18 months after the entry into force of this Regulation - i.e. 1 June 2022*]. Such declarations shall not be valid after [*OP: please insert 42 months years after the entry into force of this Regulation - i.e. 1 June 2024*].

4. Paragraph 3 of Article 15 shall apply from 1 July 2021.';

(12) point (1) of point UAS.OPEN.020 is replaced by the following:

'(1) for unmanned aircraft referred to in point (5)(d), be conducted in such a way that a remote pilot of the unmanned aircraft does not overfly assemblies of people and reasonably expects that ~~no uninvolved~~ ~~person~~ only involved persons will be overflown. In the event of unexpected overflight of ~~uninvolved~~ persons who are not involved, the remote pilot shall reduce as much as possible the time during which the unmanned aircraft overflies those persons;';

(13) point (2) of point UAS.OPEN.020 is replaced by the following:

'(2) in the case of an unmanned aircraft referred to in points (5)(a), (5)(b) and (5)(c), be conducted in such a way that the remote pilot of the unmanned aircraft may overfly ~~uninvolved~~ persons who are not involved, but shall never overfly assemblies of people;

(14) point (4)(b) of point UAS.OPEN.020 is replaced by the following:

'(b) in the case of an unmanned aircraft class C1, as defined in Part 2 of the Annex to Regulation (EU) 2019/945, who has completed an online training course followed by completing successfully an online theoretical knowledge examination provided by the competent authority or by an entity recognised by the competent authority of ~~the~~ a Member State ~~of registration of the UAS operator~~. The examination shall comprise 40 multiple-choice questions distributed appropriately across the following subjects:

i. air safety;

ii. airspace restrictions;

iii. aviation regulations;

iv. human performance limitations;

v. operational procedures;

vi. UAS general knowledge;

vii. privacy and data protection;

viii. insurance;

ix. security.';

(15) point (1) of point UAS.OPEN.030 is replaced by the following:

'(1) be conducted in such a way that the unmanned aircraft does not overfly ~~uninvolved~~ persons who are not involved and the UAS operations take place at a safe horizontal distance of at least 30 metres from them; the remote pilot may reduce the horizontal safety distance down to a minimum of 5 metres from uninvolved persons when operating an unmanned aircraft with an active low speed mode function and after evaluation of the situation regarding:

(a) weather conditions,

(b) performance of the unmanned aircraft,

(c) segregation of the involved area.';

(16) point (2) of point UAS.OPEN.030 is replaced by the following:

'(2) be performed by a remote pilot who is familiar with the user's manual provided by the manufacturer of the UAS and holds a certificate of remote pilot competency issued by the competent authority or by an entity recognised by the competent authority of a ~~the~~ Member State ~~of registration of the UAS operator~~. This certificate shall be obtained after complying with all of the following conditions and in the order indicated:

(a) completing an online training course and passed the online theoretical knowledge examination as referred to in point (4)(b) of point UAS.OPEN.020;

(b) completing a self-practical training in the operating conditions of the subcategory A3 set out in points (1) and (2) of point UAS.OPEN.040;

(c) declaring the completion of the self-practical training defined in point (b) and passing an additional theoretical knowledge examination provided by the competent authority or by an entity recognised by the competent authority of a Member State. The examination shall comprise at least 30 multiple-choice questions aimed at assessing the remote pilot's knowledge of the technical and operational mitigations for ground risk, distributed appropriately across the following subjects:

i. meteorology;

ii. UAS flight performance;

iii. technical and operational mitigations for ground risk.';

(17) point (1) of point UAS.OPEN.040 is replaced by the following:

'(1) be conducted in an area where the remote pilot reasonably expects that no ~~uninvolved~~ person who is not involved will be endangered within the range where the unmanned aircraft is flown during the entire time of the UAS operation;

(18) point (3) of point UAS.OPEN.040 is replaced by the following:

'(3) be performed by a remote pilot who is familiar with the user's manual provided by the manufacturer of the UAS and who has completed an online training course and passed an online theoretical knowledge examination as defined in point (4)(b) of point UAS.OPEN.020;';

(19) point (3) of point UAS.OPEN.050 is replaced by the following:

'(3) designate a remote pilot for each ~~operation~~ flight;';

(20) point (1)(e) of point UAS.OPEN.060 is replaced by the following:

'(e) if the UAS is fitted with an additional payload, verify that its mass ~~does not~~ exceed neither the MTOM defined by the manufacturer nor ~~or~~ the MTOM limit of its class.';

(21) point (4) of point UAS.OPEN.060 is replaced by the following:

'(4) For the purposes of point (2)(b), remote pilots may be assisted by an unmanned aircraft observer~~, situated alongside them, who, by unaided visual observation of the unmanned aircraft, assists the remote pilot in safely conducting the flight~~. Clear and effective communication shall be established between the remote pilot and the unmanned aircraft observer.';

(22) point (1)(b) of point UAS.SPEC.020 is replaced by the following:

'(b) performed below 120 metres from the surface of the earth, and:

i. In uncontrolled airspace (class F or G); these operations may be limited or forbidden by Member States through UAS geographical zones in areas where the probability of encountering manned aircraft is not low; or

ii. in controlled airspace after coordination and ~~individual~~ flight authorisation in accordance with published procedures for the area of operation, so that a low probability of encountering manned aircraft is ensured.';

(23) point (1)(b) of point UAS.SPEC.050 is replaced with the following:

'(b) designate a remote pilot for each flight ~~operation~~ or, in the case of autonomous operations, ensure that during all phases of the flight ~~operation~~, responsibilities and tasks especially those defined in points (2) and (3) of point UAS.SPEC.060 are properly allocated in accordance with the procedures established pursuant to point (a) above;'

(24) point (1)(g) of point UAS.SPEC.050 is replaced with the following:

'(g) keep and maintain up to date for a minimum of three years a record of:

i. all the relevant qualifications, experience and/or training courses completed by the remote pilot and the other personnel in charge of duties essential to the UAS operation and by the maintenance staff;.

ii. the maintenance activities conducted on the UAS;

iii. the information on the UAS operations as required by the declaration or the operational authorisation.';

(25) the following points (1)(j), (1)(k), and 1(l) of point UAS.SPEC.050 are inserted:

'(j) establish and keep up to date a list of the designated remote pilots for each flight;

(k) establish and keep up to date a list of the maintenance staff employed by the operator to carry out maintenance activities; and

(l) ensure that the UA is equipped with at least one green flashing light for the purpose of conspicuity of the UA, to allow a person on the ground to distinguish the UA from a manned aircraft, when the UAS operation takes place at night and at a height not exceeding 120 m above the closest point on the surface of the earth;'

(26) point (1) of point UAS.SPEC.060 is replaced by the following:

'(1) The remote pilot shall:

(d) not perform duties under the influence of psychoactive substances or alcohol or when it is unfit to perform its tasks due to injury, fatigue, medication, sickness or other causes;

(e) have the appropriate remote pilot competency as defined in the operational authorisation, in the standard scenario defined in Appendix 1 or as defined by the LUC, and carry a proof of competency while operating the UAS; and

(f) be familiar with the user's manual provided by the manufacturer of the UAS.';

(27) the following point UAS.SPEC.085 is inserted

'UAS.SPEC.085 Duration and validity of an operational declaration':

The operational declaration shall have a limited duration of two years. It shall remain valid unless:

(a) during the oversight of the UAS operator, the competent authority has found that the UAS operation is not conducted in accordance with the operational declaration;

(b) the conditions of the UAS operation are changed such that it no longer complies with the applicable requirements of this Regulation; or

(c) the competent authority is not granted access in accordance with point UAS.SPEC.090.';

(28) new Appendices 1, 2, 3 and 4 are added according to Annex 1 to this Regulation.

Article 2

This Regulation shall enter into force on the 20th day following that of its publication in the *Official Journal of the European Union*.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels,

For the Commission

Annex 1 to Regulation (EU) ../.. amending the Regulation (EU) 2019/947

Appendix 1 for standard scenarios supporting a declaration

Annex 1 STS-01

UAS.STS-01.010 General provisions

(1) During flight, the unmanned aircraft shall be maintained within 120 metres from the closest point of the surface of the earth. The measurement of distances shall be adapted accordingly to the geographical characteristics of the terrain, such as plains, hills, mountains.

(2) When flying an unmanned aircraft within a horizontal distance of 50 metres from an artificial obstacle taller than 105 metres, the maximum height of the UAS operation may be increased up to 15 metres above the height of the obstacle at the request of the entity responsible for the obstacle.

(3) The maximum height of the operational volume shall not exceed 30 m above the maximum height allowed in points (1) and (2);

(4) During flight, the unmanned aircraft shall not carry dangerous goods.

UAS.STS-01.020 UAS operations in STS-01

UAS operations in STS-01 shall be conducted:

(1) keeping the unmanned aircraft in VLOS at all times;

(2) in accordance with the operations manual referred to in point (1) of point UAS.STS-01.030;

(3) over a controlled ground area comprising the following:

(a) for the operation of an untethered unmanned aircraft, an area the size of the:

(i) flight geography area,

(ii) contingency area, with its external limit(s) at least 10 m beyond the limit(s) of the flight geography area, and

(iii) ground risk buffer, which shall cover a distance beyond the external limit(s) of the contingency area that is at least as defined below:

Maximum height above ground	Minimum distance to be covered by the ground risk buffer for untethered unmanned aircraft	
	with MTOM up to 10 kg	with MTOM above 10 kg
30 m	10 m	20 m
60 m	15 m	30 m
90 m	20 m	45 m
120 m	25 m	60 m

(b) For operation of a tethered unmanned aircraft, a radius equal to the tether length plus 5 meters and centred on the point where the tether is fixed over the surface of the earth.

(4) at a ground speed of less than 5 meters per second in the case of untethered unmanned aircraft;

(5) by a remote pilot who:

(a) holds a certificate of remote pilot theoretical knowledge for operations in the standard scenarios issued by the competent authority or by an entity recognised by the competent authority of a Member State. This certificate shall be obtained after:

(i) having completed an online training course and passed the online theoretical knowledge examination as referred to in point (4)(b) of point UAS.OPEN.020, and

(ii) passing an additional theoretical knowledge examination provided at the competent authority or at an entity recognised by the competent authority of a Member State in accordance with Attachment A of this Annex;

(b) holds a certificate of completion of the STS-01 practical skill training, in accordance with Attachment A of this Annex and issued by an entity recognised by the competent authority of a Member State or by a UAS operator that has declared compliance with STS-01 and that has declared compliance with the requirements in Appendix 3.

(6) with an unmanned aircraft which is marked as class C5 and complies with the requirements of that class, as defined in Part 16 of the Annex to Delegated Regulation (EU) 2019/945, and is operated with active and updated direct remote identification.

UAS.STS-01.030 Responsibilities of the UAS operator

In addition to the responsibilities defined in UAS.SPEC.050, the UAS operator shall:

(1) develop an operations manual including the elements defined in Appendix 5;

(2) define the operational volume and ground risk buffer for the intended operations, including the controlled ground area covering the projections on the surface of the earth within both the volume and the buffer;

(3) ensure the adequacy of the contingency and emergency procedures through:

(a) dedicated flight tests, or

(b) simulations, provided that the representativeness of the simulation means is appropriate for the intended purpose;

(4) develop an effective emergency response plan (ERP) suitable for the operation that includes at least:

(a) the plan to limit any escalating effects of the emergency situation;

(b) the conditions to alert the relevant authorities and organisations, if needed;

(c) the criteria to identify an emergency situation; and

(d) clear delineation of the duties of the remote pilot(s) and any other personnel in charge of duties essential to the UAS operation;

(5) ensure that the level of performance for any externally provided service necessary for the safety of the flight is adequate for the intended operation;

(6) define the allocation of the roles and responsibilities between the operator and the external service provider(s), if applicable;

(7) upload updated information into the geo-awareness system, if the system is installed on the UAS, when required by the UAS geographical zone for the intended location of operation;

(8) ensure that, before starting the operation, the controlled ground area is in place, effective and compliant with the minimum distance defined in UAS.STS-01.020(2) and, when required, coordination with the appropriate authorities has been conducted;

(9) ensure that, before starting the operation, all persons present in the controlled ground area:

(a) have been informed of the risks of the operation;

(b) have been briefed or trained, as appropriate, on the safety precautions and measures established by the UAS operator for their protection; and

(c) have explicitly agreed to participate in the operation;

(10) ensure that the:

(a) UAS is accompanied by the corresponding EU declaration of conformity, including the reference to class C5; and

(b) class C5 identification label is affixed to the unmanned aircraft.

UAS.STS-01.040 Responsibilities of the remote pilot

In addition to the responsibilities defined in UAS.SPEC.060, the remote pilot shall:

(1) before starting a UAS operation, verify that the means to terminate the flight of the unmanned aircraft and the direct remote identification system are operational;

(2) during the flight:

(a) keep the unmanned aircraft in VLOS and maintain a thorough visual scan of the airspace surrounding the unmanned aircraft in order to avoid any risk of a collision with any manned aircraft. The remote pilot shall discontinue the flight if the operation poses a risk to other aircraft, people, animals, environment or property;

(b) for the purposes of point (a), remote pilots may be assisted by an unmanned aircraft observer. Clear and effective communication shall be established between the remote pilot and the unmanned aircraft observer;

(c) have the ability to maintain control of the unmanned aircraft, except in the case of a lost command and control link;

(d) operate only one unmanned aircraft at a time;

(e) not operate the unmanned aircraft while operating a moving vehicle;

(f) not hand over the control of the unmanned aircraft to other equipment control the unmanned aircraft remotely;

(g) perform the contingency procedures defined by the UAS operator for abnormal situations, including when the remote pilot has an indication that the unmanned aircraft may exceed the limits of the flight geography; and

(h) perform the emergency procedures defined by the UAS operator for emergency situations, including triggering the means to terminate the flight when the remote pilot

has an indication that the unmanned aircraft may exceed the limits of the operational volume. The means to terminate the flight shall be triggered at least 10 m before the unmanned aircraft reaches the limits of the operational volume.

ATTACHMENT A: REMOTE PILOT THEORETICAL KNOWLEDGE AND PRACTICAL SKILL FOR STS 01

1. Theoretical knowledge examination

(a) The examination referred in point (5) of point UAS.STS-01.020 shall comprise at least 40 multiple-choice questions aimed at assessing the remote pilot's knowledge of the technical and operational mitigations, distributed appropriately across the following subjects:

(i) aviation regulations;

(ii) human performance limitations;

(iii) operational procedures;

(iv) technical and operational mitigations for ground risk;

(v) UAS general knowledge;

(vi) meteorology;

(vii) the flight performance of the UAS; and

(viii) technical and operational mitigations for air risks.

(b) If the student remote pilot already holds a certificate of remote pilot competency as referred to in point (2) of point UAS.OPEN.030, the examination shall comprise at least 30 multiple-choice questions distributed appropriately across the subjects in points (1)(a)(i) to (1)(a)(v).

(c) To pass the theoretical knowledge examination, the remote pilot student shall achieve at least 75 % of the overall marks.

2. Practical skill training and assessment

The training and assessment of the practical skill for operations under any standard scenarios shall cover at least the subjects and areas identified in Table 1 below:

Table 1: Subjects and areas to be covered for practical skill training and assessment

Subject	Areas to be Covered
(a) Pre-Flight Actions	(i) Planning operations, airspace considerations and site risk-assessment. The following points are to be included: (A) identify the objectives of the intended operation; (B) make sure that the defined operational volume and relevant buffers (e.g. ground risk buffer) are suitable for the intended operation; (C) spot the obstacles in the operational volume that could hinder the intended operation; (D) detect whether the air flow may be affected by topography or by obstacles in the operational volume; (E) heed external phenomena that can affect the flight, and assess their impact on the operation;

Subject	Areas to be Covered
	(F) select relevant data on airspace information (including on UAS geographical zones) that can have an impact on the intended operation; (G) make sure the UAS is suittable for the intended operation; (H) make sure that the selected payload is compatible with the UAS used for the operation; (I) 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 for the relevant scenario. (J) implement the necessary procedures to operate in controlled airspace, including a protocol to communicate with ATC and obtain clearance and instructions, if necessary; (K) confirm that all the necessary documents for the intended operation are on site; and (L) briefing all participants about the planned operation. (ii) UAS pre-flight inspection and set-up (including flight modes and power-source hazards). The following points are to be included: (A) assess the general condition of the UAS; (B) ensure that all the removable components of the UAS are properly secured; (C) make sure that the UAS software configurations are compatible; (D) calibrate the instruments in the UAS; (E) identify any flaw that may jeopardise the intended operation; (F) make sure that the energy level of the battery is sufficient for the intended operation; (G) make sure that the flight termination system of the UAS and its triggering system are compliant; (H) check the correct functioning of the command and control link;

Subject	Areas to be Covered
	(I) activate the geo-awareness system and upload the information to it (if geo-awareness system is available); and (J) set the height and speed limitation systems (if available). (iii) 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.
(b) In Flight Procedures	(i) Maintaining an effective look-out and keeping the unmanned aircraft within visual line of sight (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. (ii) Performing accurate and controlled flight manoeuvres at different heights and distances representative of the corresponding STS (including flight in manual/non-GNSS assisted mode or the equivalent, where fitted). At least the following manoeuvres shall be performed: (A) hover in position (only for rotorcraft); (B) transition from hover into forward flight (only for rotorcraft); (C) climb and descent from level flight; (D) turns in level flight; (E) speed control in level flight; (F) actions after a failure of a motor/ propulsion system; and (G) evasive action (manoeuvres) to avoid collisions; (iii) Real-time monitoring of the UAS status and endurance limitations. (A) Flight under abnormal conditions: (a) deal optimally with a partial or complete power shortage of the unmanned aircraft propulsion system while ensuring the safety of third parties on the ground; (b) manage the path of the unmanned aircraft in abnormal situations;

Subject	Areas to be Covered
	(c) manage a situation in which the unmanned aircraft positioning equipment is impaired; (d) manage a situation of an incursion by an person not involved into the operational volume or the controlled ground area, and take appropriate measures to maintain safety; (e) manage the exit of the unmanned aircraft from the flight geography (contingency procedures) and from the operational volume (emergency procedures) as defined during the flight preparation; (f) manage the situation when a manned aircraft approaches the operational volume; and (g) demonstrate the recovery method following a deliberate (simulated) loss of the command and control link.
(c) Post Flight Actions	(i) Shutting down and securing the UAS. (ii) 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. (iii) Conduct a debriefing about the operation. (iv) Identify situations when an occurrence report was necessary and complete the required occurrence report.

Annex 2 STS-02

UAS.STS-02.010 General provisions

(1) During flight, the unmanned aircraft shall be maintained within 120 metres from the closest point of the surface of the earth. The measurement of distances shall be adapted accordingly to the geographical characteristics of the terrain, such as plains, hills, mountains.

(2) When flying an unmanned aircraft within a horizontal distance of 50 metres from an artificial obstacle taller than 105 metres, the maximum height of the UAS operation may be increased up to 15 metres above the height of the obstacle at the request of the entity responsible for the obstacle.

(3) The maximum height of the operational volume shall not exceed 30 m above the maximum height allowed in points (1) and (2).

(4) During flight, the unmanned aircraft shall not carry dangerous goods.

UAS.STS-02.020 UAS operations in STS-02

UAS operations in STS-02 shall:

(1) be conducted in accordance with the operations manual referred to in point (1) of point UAS.STS-02.030;

(2) be conducted over a controlled ground area entirely located in a sparsely populated area. Such a controlled ground area shall include a ground risk buffer covering a distance that is at least equal to the distance specified by the UAS manufacturer in the user's manual, considering the operational conditions within the limitations specified by the UAS manufacturer;

(3) be conducted in an area where the minimum flight visibility is more than 5 km;

(4) be launched and recovered at a distance such that it is visible by the remote pilot, unless the latter is the result of an emergency flight termination;

(5) if no visual observer is used in the operation, be conducted with the unmanned aircraft flying no further than 1 km from the remote pilot, with the unmanned aircraft following a pre-programmed trajectory when the unmanned aircraft is not in VLOS of the remote pilot;

(6) if one or more visual observers are used in the operation, comply with the following conditions:

(a) visual observer(s) shall be positioned to provide adequate coverage of the operational volume and the surrounding airspace with the minimum flight visibility indicated in point (4);

(b) the unmanned aircraft is operated no further than 2 km from the remote pilot;

(c) the unmanned aircraft is operated no further than 1 km from the visual observer who is nearest to the unmanned aircraft;

(d) the distance between any visual observer and the remote pilot is not more than 1 km; and

(e) robust and effective communication means are available for the communication between the remote pilot and the visual observer(s);

(8) be conducted by a remote pilot who:

(a) holds a certificate of remote pilot theoretical knowledge for operations in standard scenarios, issued by the competent authority or by an entity recognised by the competent authority of a Member State. This certificate shall be obtained after:

(i) having completed an online training course and passed the online theoretical knowledge examination as referred to in point (4)(b) of point UAS.OPEN.020, and

(ii) passing an additional theoretical knowledge examination provided at the competent authority or at an entity recognised by the competent authority of a Member State in accordance with Attachment A of this Annex;

(b) holds a certificate of completion of the STS-02 practical skill training, in accordance with Attachment A of this Annex and issued by a an entity recognised by the competent authority of a Member State or by a UAS operator that has declared compliance with STS-02 and that has declared compliance with the requirements in Appendix 3;

(9) be conducted with an unmanned aircraft which is marked as class C6 and complies with the requirements of that class, as defined in Part 17 of the Annex to Regulation (EU) 2019/945, and it is operated with an active system to prevent the UA from breaching the flight geography.

UAS.STS-02.030 Responsibilities of the UAS operator

In addition to the responsibilities defined in UAS.SPEC.060, the UAS operator shall:

(1) develop an operations manual including the elements defined in Appendix 5;

(2) define the operational volume and ground risk buffer for the intended operations, including the controlled ground area covering the projections on the surface of the earth of both the volume and the buffer;

(3) ensure the adequacy of the contingency and emergency procedures through:

(a) dedicated flight tests, or

(b) simulations, provided that the representativeness of the simulation means is appropriate for the intended purpose;

(4) develop an effective emergency response plan (ERP) suitable for the operation that includes at least:

(a) a plan to limit the escalating effects of the emergency situation;

(b) the conditions to alert the relevant authorities;

(c) the criteria to identify an emergency situation; and

(d) clear delineation of the duties of the remote pilot(s) and any other personnel in charge of duties essential to the UAS operation;

(5) ensure that the level of performance for any externally provided service necessary for the safety of the flight is adequate for the intended operation;

(6) define the allocation of the roles and responsibilities between the operator and the external service provider(s), if applicable;

(7) upload updated information into the geo-awareness, if the system is installed on the UAS, when required by the geographical zone for the intended location of the operation;

(8) ensure that, before starting the operation, the controlled ground area is in place, effective and compliant with the minimum distance defined in UAS.STS-02.020(2) and, when required, coordination with the appropriate authorities has been conducted;

(9) ensure that, before starting the operation, all persons present in the controlled ground area:

(a) have been informed of the risks of the operation;

(b) have been briefed and, if applicable, trained on the safety precautions and measures established by the UAS operator for their protection; and

(c) have explicitly agreed to participate in the operation;

(10) before starting the operation, if visual observers are used, ensure:

(a) the correct placement and number of visual observers along the intended flight path;

(b) the verification:

(1) of the compliance between the visibility and the planned range for each visual observer;

(2) of the absence of potential terrain obstructions for each visual observer;

(3) that there are no gaps between the zones covered by each of the visual observers;

(4) that the communication with each visual observer is established and effective; and

(5) that if means are used by the visual observers to determine the position of the unmanned aircraft, those means are functioning and effective;

(c) that the visual observers have been briefed on the intended path of the unmanned aircraft and the associated timing.

(11) ensure that the:

(a) UAS is accompanied by the corresponding EU declaration of conformity, including the reference to class C6; and

(b) class C6 identification label is affixed to the unmanned aircraft.

UAS.STS-02.040 Responsibilities of the remote pilot

In addition to the responsibilities defined in UAS.SPEC.060, the remote pilot shall:

(1) before starting a UAS operation:

(a) set the programmable flight volume of the unmanned aircraft to keep it within the flight geography; and

(b) verify that the means to terminate the flight and the programmable flight volume functionality on the unmanned aircraft are operational;

(2) during flight:

(a) unless supported by visual observers, maintain a thorough visual scan of the airspace surrounding the unmanned aircraft in order to avoid any risk of a collision with any manned aircraft. The remote pilot shall discontinue the flight if the operation poses a risk to other aircraft, people, animals, environment or property;

(b) have the ability to maintain control of the unmanned aircraft, except in the case of a lost command and control link;

(c) operate only one unmanned aircraft at a time;

(d) not operate from a moving vehicle;

(e) not hand-over the control of the unmanned aircraft to other equipment to control unmanned aircraft remotely;

(f) inform the visual observer(s), when employed, in a timely manner of any deviations of the unmanned aircraft from the intended path, and the associated timing;

(g) perform the contingency procedures defined by the UAS operator for abnormal situations, including when the remote pilot has indication that the unmanned aircraft may exceed the limits of the flight geography; and

(h) perform the emergency procedures defined by the UAS operator for emergency situations, including triggering the means to terminate the flight when the remote pilot has an indication that the unmanned aircraft may exceed the limits of the operational volume.

UAS.STS-02.050 Responsibilities of the visual observer

A visual observer shall:

(1) maintain awareness of the position of the unmanned aircraft through direct visual observation or through assistance provided by an electronic means; and

(2) alert the remote pilot when a hazard is detected and assist in avoiding or minimising the potential negative effects.

ATTACHMENT A: REMOTE PILOT THEORETICAL KNOWLEDGE AND PRACTICAL SKILL FOR STS 02

1. Theoretical knowledge examination

The examination shall be defined in accordance with point A.1 of Attachment A to Annex 1.

2. Practical skill training and assessment

In addition to the areas defined in point A.2 of Attachment A to Annex 1, the following areas shall be covered:

Table 2: Additional subjects and areas to be covered for practical skill training and assessment for STS-02

Subject	Areas to be Covered
(a) BVLOS operations	i. Pre-flight actions – operation planning, airspace considerations and site risk-assessment. The following points are to be included: (A) Airspace scanning; and (B) Operations with visual observers (VOs): adequate placement of VOs, and a de-confliction scheme that includes phraseology, coordination and communications means; ii. The in-flight procedures, defined in point 2.(b)(ii) of Attachment A to Annex 1, shall be performed both in VLOS and BVLOS.

Appendix 2: Operational declaration

STS-x **Operational declaration**

Data protection: Personal data included in this declaration 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 oversight activities according to Regulation (EU) 2019/947. If you require further information concerning the processing of your personal data or you wish to exercise 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 Supervisory Authority.			
UAS operator registration number			
UAS operator Name			
I hereby declare that: – **I comply with all the applicable provisions of Regulation (EU) 2019/947 and with STS.x; and** – **appropriate insurance cover will be in place for every flight made under the declaration, if required by Union or national law.**			
Date		**Signature or other verification**	

Appendix 3: Additional requirements for operators conducting practical skill training and assessment of remote pilots for operations covered by STS

A UAS operator intending to conduct practical skill training and assessment of remote pilots for a STS, in addition to submitting the operational declaration for that STS, shall declare to the competent authority compliance with the following requirements using the declaration form in Appendix 4. If the UAS operator intends to conduct a training activity in a Member State other than the Member State of registration, a copy of the declaration defined in Appendix 4 shall be submitted to the competent authority of the Member State where the training is conducted.

(1) There shall be a clear separation between the training activities and any other operational activity such that the objectivity of the UAS operator is not called into question.

(2) The UAS operator shall have the capability to adequately perform the technical and administrative activities linked with the entire task process, including the adequacy of personnel and the use of facilities and equipment appropriate to the task.

(3) The UAS operator shall have an accountable manager, with the responsibility for ensuring that all tasks are performed in compliance with the information and procedures identified in point (8).

(4) The personnel responsible for the practical skill training and practical skill assessment tasks shall:

(a) have the competence to conduct these tasks. Personnel participating in the assessments shall not participate in them if they feel that their objectivity may be affected;

(b) have a sound theoretical knowledge and practical skill training experience, and satisfactory knowledge of the requirements for the practical skill assessment tasks they carry out and adequate experience of such processes;

(c) have the ability to administer the declarations, records and reports that demonstrate that the relevant practical skill assessments have been carried out and the conclusions of those practical skill assessments; and

(d) not disclose any information supplied by the operator or remote pilot to any person other than the competent authority upon their request.

(5) The training and assessment shall cover the practical skills corresponding to the STS for which the declaration is made, included in Attachment A to the relevant Annex.

(6) The primary practical skill training and assessment location(s) shall be outdoors where possible and suitable for this task, i.e. of suitable dimensions, volume and airspace class. If the UAS operator chose to utilise an indoor facility, then the facility shall be of a sufficient size to accommodate all the precision flight elements.

(7) The practical skill assessment shall consist of a continuous evaluation of the student remote pilot.

(8) The UAS operator shall produce an assessment report after completing the practical skill assessment, which shall:

(a) include at least:

(i) the student remote pilot's identification details;

(ii) the identity of the person responsible for the practical skill assessment;

(iii) the identification of the STS for which the practical skill assessment has been performed;

(iv) performance marks for each action performed by the student remote pilot;

(v) an overall practical skill assessment of the student remote pilot's competencies; and

(vi) practical skill assessment feedback providing guidance on areas for improvement where applicable;

(b) be appropriately signed and dated by the person responsible for the practical skill assessment once complete; and

(c) be recorded and made available for inspection by the competent authority upon request.

(9) A certificate of completion of the practical skill training for the STS shall be delivered to the student remote pilot by the UAS operator if the assessment report concludes that the student remote pilot has achieved a satisfactory level of practical skill.

(10) The issuance of the certificate of completion of point (9) shall be notified to the competent authority including the student remote pilot's identification details, the STS covered, the date of issuance and the identification details of the UAS operator issuing it.

(11) The UAS operator shall include in the operations manual, developed in accordance with Appendix 5, a separate section covering the training elements, including the following:

(a) the nominated personnel conducting practical skill training and assessment, including:

(i) descriptions of the respective personnel's competence;

(ii) the personnel's duties and responsibilities; and

(iii) a chart of the organisation showing the associated chains of responsibility;

(b) the procedures and processes used for practical skill training and assessment, including the training syllabus covering the practical skill corresponding to the STS for which the declaration is made, defined in Attachment A to the relevant Annex;

(c) a description of the UAS and any other equipment and tools used for the practical skill training and assessment,

(d) a description of the facilities for practical skill training and assessment, including the physical location; and

(e) a template for the assessment report.

Appendix 4: Declaration of UAS operators intending to provide practical skill training and assessment of remote pilots in STS-x

STS-x
Declaration of UAS operators intending to provide practical skill training and assessment of remote pilots

Data protection: Personal data included in this declaration 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 oversight activities according to Regulation (EU) 2019/947.

If you require further information concerning the processing of your personal data or you wish to exercise 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 Supervisory Authority.

UAS operator registration number	
UAS operator Name	

I hereby declare that

- **I have submitted the operational declaration for the STS-x ;**
- **I comply with the requirements defined in Appendix 3 of the Regulation (EU) 2019/947; and**
- **during the training activities, I complied with all the applicable provisions of Regulation (EU) 2019/947, in particular with STS.x**

Date		**Signature or other verification**	

Appendix 5: Operations manual

The operations manual shall contain at least the following:

(1) a statement that the operations manual complies with the relevant requirements of Regulation (EU) 2019/947 and with the declaration, and contains instructions that are to be complied with by the personnel involved in flight operations;

(2) an approval signature by the accountable manager or the UAS operator in the case of a natural person;

(3) an overall description of the UAS operator's organisation;

(4) a description of the concept of the operation, including at least:

(a) the nature and description of the activities performed in the UAS operations, and the identified associated risks;

(b) the operational environment and geographical area for the intended operations, including:

(i) the characteristics of the area to be overflown in terms of the population density, topography, obstacles etc., and the characteristics of the airspace to be used, and the environmental conditions (i.e. the weather and electromagnetic environment); and

(ii) the definition of the operational volume and risk buffers to address the ground and air risks;

(c) the technical means used and their main characteristics, performance and limitations, including the UAS, external systems supporting the UAS operation, facilities, etc.; and

(d) the required personnel for conducting operations, including the composition of the team, their roles and responsibilities, selection criteria, initial training and recent experience requirements and/or recurrent training;

(5) the maintenance instructions required to keep the UAS in a safe condition, covering the UAS manufacturer's maintenance instructions and requirements if applicable;

(6) operational procedures, which shall be based on the user's manual provided by the UAS manufacturer, and shall include:

(a) consideration of the following to minimise human errors:

(i) a clear distribution and assignment of tasks; and

(ii) an internal checklist to check that staff are performing their assigned tasks adequately;

(b) consideration of the deterioration of external systems supporting the UAS operation;

(c) normal procedures, including at least:

(i) pre-flight preparations and checklists, covering:

(A) the assessment of the operational volume and related buffers (the ground risk buffer, and air risk buffer when applicable), including the terrain and

potential obstacles and obstructions that may reduce the ability to keep the unmanned aircraft in visual line of sight or to scan the airspace, the potential overflight of uninvolved persons and potential overflight of critical infrastructure;

(B) the assessment of the surrounding environment and airspace, including the proximity of UAS geographical zones and potential activities by other airspace users;

(C) the environmental conditions suitable for conducting the UAS operation;

(D) the minimum number of personnel in charge of duties essential to the UAS operation who are required to perform the operation, and their responsibilities;

(E) the required communication procedures between the remote pilot(s) and any other personnel in charge of duties essential to the UAS operation and with any external parties, when needed

(F) compliance with any specific requirements from the relevant authorities in the intended area of operations, including those related to security, privacy, data and environmental protection, and the use of the RF spectrum;

(G) the required risk mitigations in place to ensure the safe conduct of the operation; in particular, for the controlled ground area:

(a) determination of the controlled ground area; and

(b) securing the controlled ground area to prevent third parties entering the area during the operation, and ensuring coordination with the local authorities, when needed;

(H) the procedures to verify that the UAS is in a suitable condition to safely conduct the intended operation;

(ii) launch and recovery procedures;

(iii) in-flight procedures, including those to ensure that the unmanned aircraft remains within the flight geography;

(iv) post-flight procedures, including the inspections to verify the condition of the UAS;

(v) procedures for the detection of potentially conflicting aircraft by the remote pilot and, when required by the UAS operator, by visual observer(s) or unmanned aircraft observer(s), as applicable.

(d) contingency procedures, including at least:

(i) procedures to cope with the unmanned aircraft leaving the desired 'flight geography';

(ii) procedures to cope with persons who are not involved entering the controlled ground area;

(iii) procedures to cope with adverse operating conditions;

(iv) procedures to cope with the deterioration of external systems supporting the operation;

(v) if visual observers (VOs) are employed, the phraseology to be used; and

(vi) avoidance procedures to avoid any conflict with other airspace users.

(e) emergency procedures to cope with emergency situations, including at least:

(i) procedures to avoid, or at least minimise, harm to third parties in the air or on the ground;

(ii) procedures to cope with the unmanned aircraft leaving the 'operational' volume; and

(iii) procedures for the emergency recovery of the UA;

(f) security procedures as referred to in UAS.SPEC.050(1)(a)(ii) and (iii);

(g) the procedures for the protection of personal data referred to in UAS.SPEC.050(1)(a)(iv);

(h) the guidelines to minimise nuisance and environmental impact referred to in UAS.SPEC.050(1)(a)(v);

(i) occurrence reporting procedures;

(j) record-keeping procedures; and

(k) the policy defining how the remote pilot(s) and any other personnel in charge of duties essential to the UAS operation can declare themselves fit to operate before conducting any operation.

4. Proposed actions to support implementation

— Detailed explanation with clarification and indicated hints on the EASA web

(Industry, Competent Authority)

— Dedicated thematic workshop/session

(Industry, Competent Authority)

— Series of thematic events organised on the regional principle

(Industry, Competent Authority)

5. References

5.1. Affected regulations

— Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems.

— Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft.

5.2. Affected decisions

— Not applicable

5.3. Other reference documents

— Not applicable

6. Appendix

Appendix 1: Risk assessment for STS-01

The following risk assessment has been conducted by applying the SORA (AMC1 to Article 11 to IA).

1. Step #1 – ConOps description

UAS operators intending to perform a UAS operation under STS-01 are required to each elaborate a concept of operations (ConOps) and describe it in the OM as required in point 4 of the proposed Appendix 5 to the IA. The ConOps needs to fit the operational limitations defined in STS-01.

As part of the ConOps, the UAS operator will need to define the required operational volume and ground risk buffer.

2. Step #2 – Determination of the intrinsic UAS ground risk class

The intrinsic UAS ground risk relates to the unmitigated risk of a person being hit by the UA (in case of a loss of control of the UA) and it can be represented by the UAS ground risk class (GRC). The GRC is derived from the intended operation and the UAS lethal area, as shown in Table A3.1

Intrinsic UAS Ground Risk Class				
Max UAS characteristic dimension	1 m	3 m	8 m	> 8 m
Typical kinetic energy expected	*< 700 J*	*< 34 kJ*	*< 1084 kJ*	*> 1084 kJ*
Operational scenarios				
VLOS/BVLOS over a controlled ground area	1	2	3	4
VLOS in a sparsely populated environment	2	3	4	5
BVLOS in a sparsely populated environment	3	4	5	6
VLOS in a populated environment	4	5	6	8
BVLOS in a populated environment	5	6	8	10
VLOS over a gathering of people	7			
BVLOS over a gathering of people	8			

Table A3.1 Determination of the intrinsic UAS ground risk class (GRC)

Considering the operational scenario defined for STS-01 (VLOS over a controlled ground area) and the UA characteristics:

— A rotorcraft or a tethered aircraft other than a fixed-wing aircraft;

— a characteristic dimension[32] of up to 3 m; and

— an MTOM up to 25 kg;

as highlighted in Table A3, the intrinsic GRC is **2.**

[32] Considering the above characteristics, the typical kinetic energy can be expected to be less than 34 kJ.

3. Step #3 – Final GRC determination

Table A1.2 lists the mitigations that need to be evaluated.

		Robustness			Correction
Mitigation Sequence	**Mitigations for ground risk**	**Low / None**	**Medium**	**High**	
1	M1 - Strategic mitigations for ground risk[33]	**0: None** **-1: Low**	**-2**	**-4**	**0**
2	M2 - Effects of ground impact are reduced[34]	**0**	**-1**	**-2**	**0**
3	M3 - An emergency response plan (ERP) is in place, operator validated and effective	**1**	**0**	**-1**	**0**
Total correction					**0**

Table A1.4 Mitigations for determination of the Final GRC

An evaluation of the different possible ground risk mitigations was made:

— M1 (strategic mitigations for ground risk): operation over controlled ground is already taken credit for in the assessment of the initial ground risk; if a tether is used, M1 may be claimed, but the SORA does not allow the GRC to be reduced to a lower value than the lowest value in the applicable column. Thus, a correction of 0 is determined.

— M2 (effects of ground impact are reduced): even if the UAS is equipped with a system to reduce the effect of the UA impact dynamics (e.g. a parachute), it was decided to not take any credit for that, since no further technical requirements are imposed on the system used to reduce the effect of the UA impact dynamics. The system is required only for human factors considerations. No specific requirements are included for its robustness. Therefore, also for this case, a correction of 0 is determined.

— M3 (Emergency Response Plan): in order to keep the GRC at 2, an ERP is required with a 'medium' level of robustness. This medium level is achieved through the requirements defined in the proposed point UAS.STS-01.030(5) of the IA, ensuring a medium level of integrity, and may be complemented by the remote flight crew training defined in the GM1 to UAS.SPEC.050(1)(d).

Therefore, the final intrinsic GRC is 2.

4. Steps #4 to 6 – Air risk assessment

The strategic mitigation consists of complying with the requirements of the proposed amendment to point UAS.SPEC.020(1)(b) of the IA, which requires that the airspace where operations are intended to be conducted must have a low probability of the UA encountering manned aircraft or other airspace

[33] This mitigation is meant as a means to reduce the number of people at risk.
[34] This mitigation is meant as a means to reduce the energy absorbed by the people on the ground upon impact.

users. Therefore, Member States are required to establish the appropriate measures (e.g. UAS geographical zones) to ensure this low probability of encounter.

Such a low probability of encounter is equivalent to an ARC that is not higher than ARC-b. Thus, ARC-b is to be considered here as the highest residual (final) air risk classification.

These considerations lead to a final ARC b.

5. Steps #7 – SAIL determination

Considering that for the ground risk, the final **GRC is 2,** and for the air risk, the final ARC is not more than **ARC-b**, and the resulting SAIL for STS-01 is **SAIL II**, as indicated in Table A1.5 below:

SAIL Determination				
	Residual ARC			
Final GRC	a	b	c	d
≤2	**I**	**II**	**IV**	**VI**
3	**II**	**II**	**IV**	**VI**
4	**III**	**III**	**IV**	**VI**
5	**IV**	**IV**	**IV**	**VI**
6	**V**	**V**	**V**	**VI**
7	**VI**	**VI**	**VI**	**VI**
>7	Category C operation			

Table A1.5 Determination of the SAIL

6. Step #8 – Identification of operational safety objectives (OSOs)

The purpose of this step is to evaluate the defences within the UAS operation in the form of operational safety objectives (OSOs) and the associated level of robustness depending on the SAIL. Table A1.6 provides a qualitative methodology to make this determination. In this table, O means optional, L means recommended with low robustness, M means recommended with medium robustness, and H means recommended with high robustness.

SAIL II corresponding to STS-01 is highlighted in yellow in Table A1.6 to show the required level of robustness for the different OSOs. For the discussion of how the OSO are met in STS-01, please refer to paragraph 9 of this Appendix.

OSO Number (in line with Annex E)		**SAIL**					
		I	**II**	**III**	**IV**	**V**	**VI**
	Technical issue with the UAS						
OSO#01	Ensure the operator is competent and/or proven	O	L	M	H	H	H

OSO Number (in line with Annex E)		SAIL					
		I	**II**	**III**	**IV**	**V**	**VI**
OSO#02	UAS manufactured by competent and/or proven entity	O	O	L	M	H	H
OSO#03	UAS maintained by competent and/or proven entity	L	L	M	M	H	H
OSO#04	UAS developed to authority-recognized design standards[35]	O	O	O	L	M	H
OSO#05	UAS is designed considering system safety and reliability	O	O	L	M	H	H
OSO#06	C3 link performance is appropriate for the operation	O	L	L	M	H	H
OSO#07	Inspection of the UAS (product inspection) to ensure consistency with the ConOps	L	L	M	M	H	H
OSO#08	Operational procedures are defined, validated and adhered to	L	M	H	H	H	H
OSO#09	Remote crew trained, current and able to control the abnormal situation	L	L	M	M	H	H
OSO#10	Safe recovery from technical issues	L	L	M	M	H	H
	Deterioration of external systems supporting UAS operations						
OSO#11	Procedures are in place to handle the deterioration of external systems supporting UAS operations	L	M	H	H	H	H
OSO#12	The UAS is designed to manage the deterioration of external systems supporting UAS operations	L	L	M	M	H	H
OSO#13	External services supporting UAS operations are adequate for the operation	L	L	M	H	H	H
	Human Error						
OSO#14	Operational procedures are defined, validated and adhered to	L	M	H	H	H	H
OSO#15	Remote crew are trained, current and able to control the abnormal situation	L	L	M	M	H	H
OSO#16	Multi-crew coordination	L	L	M	M	H	H

[35] The robustness level does not apply to mitigations for which credit has been taken to derive the risk classes. This is further detailed in para. 3.2.11(a).

OSO Number (in line with Annex E)		SAIL					
		I	**II**	**III**	**IV**	**V**	**VI**
OSO#17	Remote crew is fit to operate	L	L	M	M	H	H
OSO#18	Automatic protection of the flight envelope from human error	O	O	L	M	H	H
OSO#19	Safe recovery from human error	O	O	L	M	M	H
OSO#20	A human factors evaluation has been performed and the HMI found appropriate for the mission	O	L	L	M	M	H
	Adverse operating conditions						
OSO#21	Operational procedures are defined, validated and adhered to	L	M	H	H	H	H
OSO#22	The remote crew is trained to identify critical environmental conditions and to avoid them	L	L	M	M	M	H
OSO#23	Environmental conditions for safe operations are defined, measurable and adhered to	L	L	M	M	H	H
OSO#24	UAS is designed and qualified for adverse environmental conditions	O	O	M	H	H	H

Table A1.6 Recommended operational safety objectives (OSO)

7. Step #9 – Adjacent area/airspace considerations

Since each operation under STS-01 is performed over a controlled ground area and in a populated environment, the following three requirements apply:

1. the probability of leaving the operational volume should be less than 10-4/FH.
2. no single failure[5] of the UAS or any external system supporting the operation should lead to operation outside the ground risk buffer.
3. software (SW) and airborne electronic hardware (AEH) whose development error(s) could directly lead to operations outside the ground risk buffer should be developed to an industry standard or methodology recognized as adequate by the competent authority.

Regarding requirement #1, despite the fact that the scenario is built based on experience in some Member States, there is a lack of statistical data to estimate the order of magnitude expected for the probability of the UA leaving the operational volume. However, the technical requirements proposed for the UAS used in STS-01 are deemed sufficient to bring that likelihood down to a tolerable level, probably in the order indicated by the SORA.

Requirements #2 and #3 are considered to be met through the mandate to use a UA equipped with a means to terminate the flight, with its activation independent from the on-board automatic flight control and guidance system.

8. Step #10 – Comprehensive safety portfolio

Not applicable. This step is only necessary when the operator is requested to present an operational risk assessment to its competent Authority. This explanatory note can be considered to be the safety portfolio supporting the declarations made under STS-01 and STS-02.

9. Compliance with OSOs

Operational Safety Objectives (OSOs)		SAIL II expected level of robustness	Criteria in SORA for SAIL II	Requirements applicable to STS-01
OSO #01 – Ensure the operator is competent and/or proven	LEVEL of INTEGRITY	Low	The applicant is knowledgeable about the UAS being used and as a minimum has the following relevant operational procedures: checklists, maintenance, training, responsibilities, and associated duties.	Point UAS.SPEC.050 of the IA requires the UAS operator to '*establish procedures and limitations adapted to the type of the intended operation and the risk involved'.* Furthermore, the proposed point UAS.STS-01.030 of the IA requires the UAS operator to develop an OM. The proposed Appendix 5 of the IA includes all the aspects to be considered and it covers those indicated by SORA.
	LEVEL of ASSURANCE		The elements delineated in the level of integrity are addressed in the ConOps	The proposed point UAS.STS-01.030 of the IA requires the UAS operator to develop an OM. The proposed Appendix 5 of the IA includes elements of the description of the ConOps.
OSO #03 – UAS maintained by competent and/or proven entity (e.g. industry standards)	LEVEL of INTEGRITY	Low	The UAS maintenance instructions are defined and, when applicable, cover the UAS designer's instructions and requirements. The maintenance staff are competent and have received an authorisation to carry out UAS maintenance. The maintenance staff use the UAS maintenance instructions while performing maintenance.	The requirements of this OSO are included in point UAS.SPEC.050(1)(i) that requires *'the UAS operator to maintain the UAS in a suitable condition for safe operation, to define maintenance instructions and employ an adequately trained and qualified maintenance staff*'. In addition, the AMC to point UAS.SPEC.050(1)(e)(ii) specifies that '*The UAS operator should ensure that the personnel in charge of duties essential to the UAS operation apply the procedures contained in the operations manual*'.

Operational Safety Objectives (OSOs)		**SAIL II expected level of robustness**	**Criteria in SORA for SAIL II**	**Requirements applicable to STS-01**
	LEVEL of ASSURANCE		– Criterion #1 (Procedure): – The maintenance instructions are documented. – The maintenance conducted on the UAS is recorded in a maintenance log system. – A list of the maintenance staff authorised to carry out maintenance is established and kept up to date. – 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.	– Criterion#1: the proposed Appendix 5 of the IA requires the UAS operator to include in the OM the maintenance instructions required to keep the UAS in safe conditions. – Criterion#2: the proposed amendment to point UAS.SPEC.050 of the IA requires the UAS operator to keep and maintain up to date, for a minimum of 3 years, a record of all relevant qualifications, experience and/or training completed by the maintenance staff and a record of the maintenance activities conducted on the UAS. Moreover, the proposed amendment to point UAS.SPEC.050 of the IA requires the UAS operator to establish and keep up to date a list of maintenance staff authorised by the operator to carry out maintenance activities.
OSO #06 – C3 link performance is appropriate for the operation	LEVEL of INTEGRITY	Low	The applicant determines that performance, RF spectrum usage[1] and environmental conditions for C3 links are adequate to safely conduct the intended operation. The UAS remote pilot has the means to continuously monitor the C3 performance and ensure the performance continues to meet the operational requirements[2].	Point UAS.SPEC.050(1)(c) of the IA requires the UAS operator to '*ensure that all operations effectively use and support the efficient use of radio spectrum in order to avoid harmful interference'*. In addition, the proposed amendment to DA includes for class C5 the compliance with the following requirements of class C3:

Operational Safety Objectives (OSOs)		SAIL II expected level of robustness	Criteria in SORA for SAIL II	Requirements applicable to STS-01
			[1] For a low level of integrity, unlicensed frequency bands might be acceptable under certain conditions, e.g.: – *the applicant demonstrates compliance with other RF spectrum usage requirements (e.g. Directive 2014/53/EU), by showing the UAS equipment is compliant with these requirements, and* – *the use of mechanisms to protect against interference (e.g. FHSS, frequency deconfliction by procedure).* *[2] The remote pilot has continual and timely access to the relevant C3 information that could affect the safety of flight. For operations with a low level of integrity for this OSO, this could be achieved by monitoring the C2 link signal strength and receiving an alert from the UAS HMI if the signal becomes too low.*	– '*be safely controllable with regards to stability, manoeuvrability and performance of command and control link* […]'; and – '*unless tethered, be equipped with a command and control link protected against unauthorised access to the command and control functions'.* In addition, a requirement is proposed to also provide information on the health of the command and control link. Regarding the use of 'unlicensed frequency bands', as indicated in recital (8) of the DA the Directive 2014/53/EU applies to UA that are not subject to certification, according to Part 21, and are not intended to be operated only on frequencies allocated by the Radio Regulations of the International Telecommunication Union for protected aeronautical use. Moreover, point UAS.SPEC.060(2)(b) of the IA requires the remote pilot to '*ensure that the operating environment is compatible with the authorised or declared limitations and conditions'.*
	LEVEL of ASSURANCE		The applicant declares that the required level of integrity has been achieved.	A declaration form for the UAS operator is proposed in Appendix 2 to the IA.

Operational Safety Objectives (OSOs)		**SAIL II expected level of robustness**	**Criteria in SORA for SAIL II**	**Requirements applicable to STS-01**
				The level of assurance of the compliance with the technical requirements is ensured by the CE marking process.
OSO #07 **Inspection of the UAS (product inspection) to ensure consistency with the ConOps**	LEVEL of INTEGRITY	Low	The remote crew ensures the UAS is in a condition for safe operation and conforms to the approved concept of operations.	Point UAS.SPEC.060(2)(c) of the IA requires the remote pilot to '*ensure that the UAS is in a safe condition to complete the intended flight safely*' The proposed Appendix 5 to the IA requires: – in point 4, the UAS operator to describe the concept of operations including the intended operations; – In point 6(c)(i)(H), the UAS operator to include in the OM the procedures to verify that the UAS is in a condition to safely conduct the intended operation.
	LEVEL of ASSURANCE		– Criterion #1 (Procedure): – Product inspection is documented and accounts for the manufacturer's recommendations if available. – Criterion #2 (Training): The remote crew is trained to perform the product inspection, and that training is self-declared (with evidence available).	– Criterion #1: the verification that the UAS is in safe condition for the intended operation is included in the OM. – Criterion #2: point UAS.SPEC.050 of the IA requires that the UAS operator ensures that remote pilots '*have been informed about the UAS operator's operations manual*' and that personnel in charge of duties essential to the UAS operation, other than the remote pilot itself '*have completed the on-the-job-training*

Operational Safety Objectives (OSOs)		**SAIL II expected level of robustness**	**Criteria in SORA for SAIL II**	**Requirements applicable to STS-01**
				developed by the operator, and *have been informed about the UAS operator's operations manual'*. The proposed point UAS.STS-01.020(5) of the IA defines the minimum training for the remote pilot. Pre-flight activities are part of the training. Both the theoretical and practical skills training are accredited with a certificate (of remote pilot theoretical knowledge and of completion of STS-01 practical skills training, respectively). Thus, evidence of basic training is available. The declaration proposed in Appendix 2 to the IA covers all the requirements defined in each STS; it thus covers the competencies of the personnel involved in the operation.
Operational procedures (OSO #08, OSO #11, OSO #14 and OSO #21)	LEVEL of INTEGRITY	Medium	– Criterion #1 (Procedure definition): – Operational procedures appropriate for the proposed operation are defined and as a minimum cover the following elements: – Flight planning, – Pre and post-flight inspections,	– Criterion #1: point UAS.SPEC.050(1)(a) of the IA requires the UAS operator to '*establish procedures and limitations adapted to the type of the intended operation and the risk involved, including operational procedures to ensure the safety of the operations*'. The proposed point UAS.STS-01.030(1) of the IA requires the UAS operator to develop an OM which, as described in the proposed Appendix 5 of the IA, includes all elements indicated in SORA criterion #1.

Operational Safety Objectives (OSOs)		SAIL II expected level of robustness	Criteria in SORA for SAIL II	Requirements applicable to STS-01
			– Procedures to evaluate the environmental conditions before and during the mission (i.e. real-time evaluation), – Procedures to cope with unintended adverse operating conditions (e.g. when ice is encountered during an operation not approved for icing conditions), – Normal procedures, – Contingency procedures (to cope with abnormal situations), – Emergency procedures (to cope with emergency situations), and – Occurrence reporting procedures. – Normal, abnormal, and emergency procedures are compiled in an operations manual. – The limitations of the external systems used to support UAS safe operations are defined in an operations manual. – Criterion #2 (Procedural complexity which could jeopardize adherence to): Operational procedures	– Criterion #2: since this is still under JARUS discussion (as indicated in the note), it has not been considered. – Criterion #3: the proposed Appendix 5 of the IA requires the UAS operator to include in the operational procedures considerations to minimise human errors.

Operational Safety Objectives (OSOs)		SAIL II expected level of robustness	Criteria in SORA for SAIL II	Requirements applicable to STS-01
			involve the remote pilot taking manual control(1) when the UAS is usually automatically controlled. (1) *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 to not make things worse.* – Criterion #3 (Consideration of potential human error): Operational procedures take human errors into consideration. At a minimum, Operational procedures provide: – a clear distribution and assignment of tasks, and – an internal checklist to ensure staff are performing their assigned tasks.	
	LEVEL of ASSURANCE		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. The adequacy of the contingency and emergency procedures are proved through: – Dedicated flight tests, or	EASA will provide, in future AMC applicable to the STS, the standard(s) or means of compliance considered adequate by the Agency. The proposed point UAS.STS-01.030(4) of the IA requires the UAS operator to prove the adequacy of the contingency and emergency procedures through dedicated flight tests, or simulations.

Operational Safety Objectives (OSOs)		**SAIL II expected level of robustness**	**Criteria in SORA for SAIL II**	**Requirements applicable to STS-01**
			– Simulation provided the simulation is proven valid for the intended purpose.	
Remote crew training (OSO #09, OSO #15 and OSO #22)	LEVEL of INTEGRITY	Low	The competency-based theoretical and practical training ensures knowledge of: a) UAS regulations b) UAS airspace operating principles c) Airmanship and aviation safety d) Human performance limitations e) Meteorology f) Navigation/Charts g) UA knowledge and h) Operating procedures and is adequate for the operation.	Article 8 of the IA lists the competencies required for remote pilots operating UAS in the 'specific' category; these are further detailed in the proposed Attachment A to STS-01 and they cover the knowledge listed in this OSO. Point UAS.SPEC.050(1)(d)(i) of the IA requires the UAS operator to ensure before conducting operations that the remote pilot has the appropriate competency. The proposed amendment to point UAS.SPEC.060(1)(b) of the IA requires the remote pilot to be familiar with the user's manual provided by the manufacturer of the UAS.
	LEVEL of ASSURANCE		Training is self-declared (with evidence available)	In line with the approach used in the subcategory A2 of the 'open' category, in the proposed point UAS.STS-01.020(d) of the IA, the remote pilot is allowed to conduct self-study. However, the examination for the theoretical knowledge is required to be held at an entity recognised by the competent authority.

Operational Safety Objectives (OSOs)		**SAIL II expected level of robustness**	**Criteria in SORA for SAIL II**	**Requirements applicable to STS-01**
				Regarding the practical training, it is required that an external party provides the practical skill training and assessment. Then, the UAS operator can declare compliance with STS-01, which therefore also include a declaration that the remote pilot(s) have the necessary competencies and are familiar with the procedures.
Safe Design: OSO #10 Safe recovery from technical issue & OSO #12 The UAS is designed to manage the deterioration of external systems supporting UAS operations	LEVEL of INTEGRITY	Low	The objective of these OSOs is to complement the technical containment safety requirements by addressing the risk of a fatality occurring while operating over populated areas or gatherings of people. External systems supporting the operation are defined as systems that are not already part of the UAS but are used to: – launch / take-off the UAS, – make pre-flight checks, or – keep the UA within its operational volume (e.g. GNSS, satellite systems, air traffic management, UTM).	STS-01 includes operations in populated environments but over ground controlled areas. Therefore, the condition of the requirement 'When operating over populous areas or gatherings of people' is not met and the requirement is considered not applicable to STS-01.

Operational Safety Objectives (OSOs)		SAIL II expected level of robustness	Criteria in SORA for SAIL II	Requirements applicable to STS-01
			External systems activated/used after the loss of control of the operation are excluded from this definition. When operating over populated areas or gatherings of people, a fatality will not occur from any probable[1] failure[2] of the UAS or any external system supporting the operation. [1] 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.' [2] Some structural or mechanical failures may be excluded from the criterion if it can be shown that these mechanical parts were designed to aviation industry best practices.	
	LEVEL of ASSURANCE		A design and installation appraisal is available. In particular, this appraisal shows that: – the design and installation features (independence, separation and redundancy) satisfy the low integrity criterion;	N/A – the requirement is not applicable to STS-01.

Operational Safety Objectives (OSOs)		**SAIL II expected level of robustness**	**Criteria in SORA for SAIL II**	**Requirements applicable to STS-01**
			– particular risks relevant to the ConOps (e.g. hail, ice, snow, electromagnetic interference…) do not violate the independence claims, if any.	
OSO #13 **External services supporting UAS operations are adequate for the operation**	LEVEL of INTEGRITY	Low	The applicant ensures that the level of performance of any externally provided service necessary for the safety of the flight is adequate for the intended operation. Roles and responsibilities between the applicant and the external service provider are defined.	Those requirements are included in the proposed points (e) and (f) of point UAS.STS-01.030 of the IA.
	LEVEL of ASSURANCE		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 necessarily being available).	The declaration included in the proposed Appendix 2 of the IA ensures compliance with this requirement.
OSO #16 Multi-crew coordination	LEVEL of INTEGRITY	Low	– Criterion #1 (Procedures): – Procedure(s) to ensure coordination between the crew members and that robust and effective communication channels is (are) available and at a minimum cover: – the assignment of tasks to the crew, and – establishment of step-by-step communications.	- Criterion #1: the proposed Appendix 5 of the IA requires the UAS operator to include in the OM a clear distribution and assignment of tasks and to define the required communication procedures among remote crew members and with external parties, when needed. – Criterion #2: the proposed Attachment A to STS-01 includes the subject ‘operational procedures’, under which the training on multi-crew coordination is addressed.

Operational Safety Objectives (OSOs)		**SAIL II expected level of robustness**	**Criteria in SORA for SAIL II**	**Requirements applicable to STS-01**
			– Criterion #2 (Training): Remote Crew training covers multi-crew coordination.	
	LEVEL of ASSURANCE		– Criterion #1 (Procedures): – Procedures are not required to be validated against a recognized standard. – The adequacy of the procedures and checklists is declared. – Criterion #2 (Training): – Training is self-declared (with evidence available).	– Criterion #1: multi-crew coordination, when relevant for the operation, is required to be included as part of the OM operational procedures. As indicated above for the related OSOs (OSO #08, OSO #11, OSO #14 and OSO #21), EASA will provide in the AMC applicable to STS the standard(s) or means of compliance considered adequate by the Agency – Criterion #2: the declaration proposed in Appendix 2 to the IA covers all requirements defined in each STS; it thus covers compliance with the requirements on procedures and training, and therefore also the corresponding part for multi-crew coordination, when relevant.
OSO #17 **Remote crew is fit to operate**	LEVEL of INTEGRITY	Low	The applicant has a policy defining how the remote crew can declare themselves fit to operate before conducting any operation.	The proposed Appendix 5 of the IA requires the UAS operator to include a policy defining how the remote crew can declare themselves fit to operate before conducting any operation.
	LEVEL of ASSURANCE		The policy to define how the remote crew declares themselves fit to operate (before an operation) is documented.	This policy is documented as it is part of the OM.

Operational Safety Objectives (OSOs)		**SAIL II expected level of robustness**	**Criteria in SORA for SAIL II**	**Requirements applicable to STS-01**
OSO #20 **A Human Factors evaluation has been performed and the HMI found appropriate for the mission**	LEVEL of INTEGRITY	Low	The UAS information and control interfaces are clearly and succinctly presented and do not confuse, cause unreasonable fatigue, or contribute to remote crew errors that could adversely affect the safety of the operation. *Comments / Notes:* *If an electronic means is used to support potential visual observers in their role to maintain awareness of the position of the unmanned aircraft, its HMI:* – is sufficient to allow the visual observers to determine the position of the UA during operation; – does *not degrade the visual observer's ability to:* – scan the airspace where the unmanned aircraft is operating for any potential collision hazard; and – maintain *effective communication with the remote pilot at all times.*	Part 4 of the DA already includes for UAS in class C3 a requirement for the UAS manufacturers to ensure that the UAS can be safely controlled and manoeuvred by a remote pilot with the competency defined in the IA. The same requirement is also applicable to UAS in class C5. No visual observers are mandated in STS-01.
	LEVEL of ASSURANCE		The applicant conducts an evaluation of the UAS considering and addressing human factors to determine that the HMI is appropriate for the mission. The human-machine interface evaluation is based on engineering evaluations or analyses.	Compliance with the technical requirement will be ensured through the CE mark process.

Operational Safety Objectives (OSOs)		**SAIL II expected level of robustness**	**Criteria in SORA for SAIL II**	**Requirements applicable to STS-01**
OSO #23 **Environmental conditions for safe operations are defined, measurable and adhered to**	LEVEL of INTEGRITY	Low	– Criterion #1 (Definition): Environmental conditions for safe operations are defined and reflected in the flight manual or equivalent document. – Criterion #2 (Procedures): Procedures to evaluate the environmental conditions before and during the mission (i.e. real-time evaluation) are available and include assessment of the meteorological conditions (METAR, TAFOR, etc.) with a simple recording system. – Criterion #3 (Training): Training covers assessment of the meteorological conditions.	– Criterion #1: Part 4 of the DA includes already for UAS in class C3 a requirement for the UAS manufacturers to include in the user's manual the: – *'operational limitations (including but not limited to meteorological conditions and day/night operations)'; and* – *'appropriate description of all the risks related to UAS operations';* The same requirements are applicable also to UAS in class C5. – Criterion #2: the proposed Appendix 5 of the IA requires the UAS operator to include in the OM the environmental and weather conditions adequate to conduct the UAS operation, as well as contingency procedures to cope with adverse operating conditions. – Criterion #3: the proposed Attachment A to STS-01 includes 'meteorology' as one of the subjects. Future AMC/GM will include more details, to address obtaining and assessing weather information.
	LEVEL of ASSURANCE		– Criterion #1 (Definition): The applicant declares that the required level of integrity has been achieved[(1)]. [(1)] *Supporting evidence may or may not be available*	– Criterion #1: compliance with the UAS requirements will be ensured through the CE mark process. Standards will be developed.

Operational Safety Objectives (OSOs)		SAIL II expected level of robustness	Criteria in SORA for SAIL II	Requirements applicable to STS-01
			– Criterion #2 (Procedures): See 'level of assurance' for operational procedures (OSO #08, OSO #11, OSO #14 and OSO #21)' – Criterion #3 (Training): see the 'level of assurance' for remote crew training (OSO #09, OSO #15 and OSO #22)'	– Criterion #2: See 'level of assurance' for operational procedures (OSO #08, OSO #11, OSO #14 and OSO #21)' – Criterion #3: see the 'level of assurance' for Remote crew training (OSO #09, OSO #15 and OSO #22).

Appendix 2: Risk assessment for STS-02

The following risk assessment has been conducted by applying the SORA (AMC1 to Article 11 to Regulation (EU) 2019/947).

1. Step #1 – ConOps description

As in STS-01, UAS operators intending to perform an operation under STS-02 are required to elaborate a ConOps and describe it in the OM as required in point 4 of the proposed Appendix 5. The ConOps needs to fit the operational limitations defined in STS-02.

As part of the ConOps, the UAS operator will need to define the required operational volume and ground risk buffer.

2. Step #2 – Determination of the initial UAS ground risk class

The intrinsic UAS ground risk relates to the unmitigated risk of a person being hit by the UA (in case of a loss of control of the UA), and it can be represented by the UAS ground risk class (GRC). The GRC is derived from the intended operation and the UAS lethal area, as shown in Table A3.

Intrinsic UAS Ground Risk Class				
Max UAS characteristics dimension	1 m	3 m	8 m	>8 m
Typical kinetic energy expected	*< 700 J*	*< 34 kJ*	*< 1084 kJ*	*> 1084 kJ*
Operational scenarios				
VLOS/BVLOS over a controlled ground area	1	2	3	4
VLOS in a sparsely populated environment	2	3	4	5
BVLOS in a sparsely populated environment	3	4	5	6
VLOS in a populated environment	4	5	6	8
BVLOS in a populated environment	5	6	8	10
VLOS over a gathering of people	7			
BVLOS over a gathering of people	8			

Table A2.7 Determination of the intrinsic UAS ground risk class (GRC)

Considering the operational scenario defined for STS-02 (BVLOS over controlled ground area) and the UA characteristics:

— a rotorcraft or a tethered aircraft other than a fixed-wing aircraft;

— a characteristic dimension[36] of up to 3m;

— an MTOM up to 25 kg; and

— a ground speed of up to 50 m/s;

as highlighted in Table A3, the intrinsic GRC is **2.**

[36] Considering the above characteristics, the typical kinetic energy can be expected to be less than 34 kJ.

3. Step #3 – Final GRC determination

Table A2.2 lists the mitigations that need to be evaluated.

		Robustness			Correction
Mitigation Sequence	**Mitigations for ground risk**	**Low / None**	**Medium**	**High**	
1	M1 - Strategic mitigations for ground risk[37]	**0: None** **-1: Low**	**-2**	**-4**	**0**
2	M2 - Effects of ground impact are reduced[38]	**0**	**-1**	**-2**	**0**
3	M3 - An emergency response plan (ERP) is in place, operator validated and effective	**1**	**0**	**-1**	**0**
Total correction					**0**

Table A2.8 Mitigations for Final GRC determination

An evaluation of the different possible ground risk mitigations was made:

— M1 (strategic mitigations for ground risk): the operation over a controlled ground area is already taken credit for in the assessment of the initial ground risk; if a tether is used, M1 may be claimed, but the SORA does not allow the GRC to be reduced to a lower value than the lowest value in the applicable column when using M1. Thus, a correction of 0 is determined.

— M2 (Effects of ground impact are reduced): no system to reduce the effect of the UA impact dynamics is proposed. Therefore, also for this case, a correction of 0 is determined.

— M3 (Emergency Response Plan): in order to keep the GRC to 2, an ERP is required with a 'medium' level of robustness. Such a medium level is achieved through the requirements defined in the proposed UAS.STS-02.030(5), ensuring a medium level of integrity. They may be complemented by the remote flight crew training defined in the GM1 to UAS.SPEC.050(1)(d).

Therefore, the final intrinsic GRC is **2**.

4. Steps #4 to 6 – Air Risk Assessment

The strategic mitigation consists of complying with the requirements of the proposed amendment to point UAS.SPEC.020(1)(b) of the IA, which requires that the airspace in which operations are intended to be conducted must have a low probability of the UA encountering manned aircraft or other airspace users. Therefore, Member States are required to establish the appropriate measures (e.g. UAS geographical zones) to ensure this low probability of encounter.

Such a low probability of encounter is equivalent to an ARC that is no higher than ARC-b. Thus, ARC-b is to be considered here as the highest residual (final) air risk classification.

The main tactical mitigation is the use of visual observers, as explained in paragraph 2.3.2.2.

[37] This mitigation is meant as a means to reduce the number of people at risk.
[38] This mitigation is meant as a means to reduce the energy absorbed by the people of the ground upon impact.

5. Steps #7 – SAIL determination

Considering that for the ground risk, the final **GRC is 2** and for the air risk, the final ARC is not more than **ARC-b**, the resulting SAIL for STS-01 is **SAIL II**, as indicated in Table A1.5 below:

SAIL Determination				
	Residual ARC			
Final GRC	a	b	c	d
≤2	**I**	**II**	**IV**	**VI**
3	**II**	**II**	**IV**	**VI**
4	**III**	**III**	**IV**	**VI**
5	**IV**	**IV**	**IV**	**VI**
6	**V**	**V**	**V**	**VI**
7	**VI**	**VI**	**VI**	**VI**
>7	Category C operation			

Table A2.9 SAIL determination

6. Step #8 – Identification of Operational Safety Objectives (OSOs)

The purpose of this step is to evaluate the defences within the UAS operation in the form of operational safety objectives (OSOs) and the associated level of robustness depending on the SAIL. Table A1.6 provides a qualitative methodology to make this determination. In this table, O means optional, L means recommended with low robustness, M means recommended with medium robustness, and H means recommended with high robustness.

SAIL II corresponding to STS-02 is highlighted in yellow in Table A1.6 to show the required level of robustness for the different OSOs. For the discussion of how the OSOs are met in STS-02, please refer to paragraph 9 of this Appendix.

OSO Number (in line with Annex E)		**SAIL**					
		I	**II**	**III**	**IV**	**V**	**VI**
	Technical issue with the UAS						
OSO#01	Ensure the operator is competent and/or proven	O	L	M	H	H	H
OSO#02	UAS manufactured by competent and/or proven entity	O	O	L	M	H	H
OSO#03	UAS maintained by competent and/or proven entity	L	L	M	M	H	H

OSO Number (in line with Annex E)		SAIL					
		I	**II**	**III**	**IV**	**V**	**VI**
OSO#04	UAS developed to authority-recognized design standards[39]	O	O	O	L	M	H
OSO#05	UAS is designed considering system safety and reliability	O	O	L	M	H	H
OSO#06	C3 link performance is appropriate for the operation	O	L	L	M	H	H
OSO#07	Inspection of the UAS (product inspection) to ensure consistency with the ConOps	L	L	M	M	H	H
OSO#08	Operational procedures are defined, validated and adhered to	L	M	H	H	H	H
OSO#09	Remote crew are trained, current and able to control the abnormal situation	L	L	M	M	H	H
OSO#10	Safe recovery from technical issues	L	L	M	M	H	H
	Deterioration of external systems supporting UAS operations						
OSO#11	Procedures are in-place to handle the deterioration of external systems supporting UAS operations	L	M	H	H	H	H
OSO#12	The UAS is designed to manage the deterioration of external systems supporting UAS operations	L	L	M	M	H	H
OSO#13	External services supporting UAS operations are adequate for the operations	L	L	M	H	H	H
	Human Error						
OSO#14	Operational procedures are defined, validated and adhered to	L	M	H	H	H	H
OSO#15	Remote crew is trained, current and able to control the abnormal situation	L	L	M	M	H	H
OSO#16	Multi-crew coordination	L	L	M	M	H	H
OSO#17	Remote crew is fit to operate	L	L	M	M	H	H
OSO#18	Automatic protection of the flight envelope from human error	O	O	L	M	H	H
OSO#19	Safe recovery from human error	O	O	L	M	M	H

[39] The robustness level does not apply to mitigations for which credit has been taken to derive the risk classes. This is further detailed in para. 3.2.11(a).

OSO Number (in line with Annex E)		SAIL					
		I	**II**	**III**	**IV**	**V**	**VI**
OSO#20	A human factors evaluation has been performed and the HMI found appropriate for the mission	O	L	L	M	M	H
	Adverse operating conditions						
OSO#21	Operational procedures are defined, validated and adhered to	L	M	H	H	H	H
OSO#22	The remote crew is trained to identify critical environmental conditions and to avoid them	L	L	M	M	M	H
OSO#23	Environmental conditions for safe operations are defined, measurable and adhered to	L	L	M	M	H	H
OSO#24	UAS is designed and qualified for adverse environmental conditions	O	O	M	H	H	H

Table A2.10 Recommended operational safety objectives (OSO)

7. Step #9 – Adjacent area/airspace considerations

Operations under STS-02 are performed over a controlled ground area and in sparsely populated environments, however, since it cannot be excluded that adjacent areas will include gatherings of people or ARC-d airspace, the same three requirements listed for STS-01 in paragraph 7 of Appendix 1 apply. Moreover, the technical requirements proposed for this purpose for class C5 are also proposed for UAS to be used in STS-02 (class C6).

8. Step #10 – Comprehensive Safety Portfolio

As in STS-01 this step is not applicable. The same considerations apply as those provided in paragraph 8 of Appendix 1.

9. Compliance with OSOs

Operational Safety Objectives (OSOs)		SAIL II expected level of robustness	Criteria in SORA for SAIL II	Requirements applicable to STS-02
OSO #01 – Ensure the operator is competent and/or proven	LEVEL of INTEGRITY	Low	The applicant is knowledgeable about the UAS being used and as a minimum has the following relevant operational procedures: checklists, maintenance, training, responsibilities, and associated duties.	The same considerations as provided for STS-01 apply. The proposed point UAS.STS-02.030 of the IA provides requirements equivalent to the proposed point UAS.STS-01.030 of the IA.
	LEVEL of ASSURANCE		The elements delineated in the level of integrity are addressed in the ConOps	The same considerations as provided for STS-01 apply.
OSO #03 – UAS maintained by competent and/or proven entity (e.g. industry standards)	LEVEL of INTEGRITY	Low	The UAS maintenance instructions are defined, and when applicable, cover the UAS designer's instructions and requirements. The maintenance staff are competent and have received an authorisation to carry out UAS maintenance. The maintenance staff use the UAS maintenance instructions while performing maintenance.	The same considerations as provided for STS-01 apply.
	LEVEL of ASSURANCE		– Criterion #1 (Procedure): – The maintenance instructions are documented. – The maintenance conducted on the UAS is recorded in a maintenance log system.	The same considerations as provided for STS-01 apply.

Operational Safety Objectives (OSOs)		**SAIL II expected level of robustness**	**Criteria in SORA for SAIL II**	**Requirements applicable to STS-02**
			– A list of the maintenance staff authorised to carry out maintenance is established and kept up to date. – 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.	
OSO #06 – C3 link performance is appropriate for the operation	LEVEL of INTEGRITY	Low	The applicant determines that the performance, RF spectrum usage[1] and environmental conditions for C3 links are adequate to safely conduct the intended operation. The UAS remote pilot has the means to continuously monitor the C3 performance and ensure the performance continues to meet the operational requirements[2]. *[1] For a low level of integrity, unlicensed frequency bands might be acceptable under certain conditions, e.g.:* – *the applicant demonstrates compliance with other RF spectrum usage requirements (e.g. Directive 2014/53/EU), by showing the UAS*	The same considerations as provided for STS-01 apply. Moreover, the technical requirements proposed for this purpose for class C5 are also proposed for UAS to be used in STS-02 (class C6)

Operational Safety Objectives (OSOs)		SAIL II expected level of robustness	Criteria in SORA for SAIL II	Requirements applicable to STS-02
			equipment is compliant with these requirements, and – *the use of mechanisms to protect against interference (e.g. FHSS, frequency deconfliction by procedure).* *[2] The remote pilot has continual and timely access to the relevant C3 information that could affect the safety of flight. For operations with a low level of integrity for this OSO, this could be achieved by monitoring the C2 link signal strength and receiving an alert from the UAS HMI if the signal becomes too low.*	
	LEVEL of ASSURANCE		The applicant declares that the required level of integrity has been achieved	The same considerations as provided for STS-01 apply.
OSO #07 Inspection of the UAS (product inspection) to ensure consistency towith the ConOps	LEVEL of INTEGRITY	Low	The remote crew ensures the UAS is in a condition for safe operation and conforms to the approved concept of operations.	The same considerations as provided for STS-01 apply.
	LEVEL of ASSURANCE		– Criterion #1 (Procedure): – Product inspection is documented and accounts for the manufacturer's recommendations if available.	The same considerations as provided for STS-01 apply. The proposed point UAS.STS-02.020(8) of the IA defines the minimum training for the remote pilot as described in 2.3.2.4.

Operational Safety Objectives (OSOs)		**SAIL II expected level of robustness**	**Criteria in SORA for SAIL II**	**Requirements applicable to STS-02**
			– Criterion #2 (Training): The remote crew is trained to perform the product inspection, and that training is self-declared (with evidence available).	Both the theoretical and practical skills training are accredited with a certificate (of remote pilot theoretical knowledge and of completion of the STS-02 practical skills training, respectively).
Operational procedures (OSO #08, OSO #11, OSO #14 and OSO #21)	LEVEL of INTEGRITY	Medium	– Criterion #1 (Procedure definition): – Operational procedures appropriate for the proposed operation are defined and, as a minimum cover, the following elements: – Flight planning, – Pre and post-flight inspections, – Procedures to evaluate the environmental conditions before and during the mission (i.e. real-time evaluation), – Procedures to cope with unintended adverse operating conditions (e.g. when ice is encountered during an operation not approved for icing conditions), – Normal procedures, – Contingency procedures (to cope with abnormal situations),	The same considerations as provided for STS-01 apply.

Operational Safety Objectives (OSOs)		SAIL II expected level of robustness	Criteria in SORA for SAIL II	Requirements applicable to STS-02
			– Emergency procedures (to cope with emergency situations), and – Occurrence reporting procedures. – Normal, abnormal, and emergency procedures are compiled in an operations manual. – The limitations of the external systems used to support UAS safe operations are defined in an operations manual. – Criterion #2 (Procedural complexity which could jeopardize adherence to): Operational procedures involve the remote pilot taking manual control(1) when the UAS is usually automatically controlled. (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 to not make things worse* – Criterion #3 (Consideration of Potential Human Error): Operational procedures take human errors into consideration. At a minimum, operational procedures provide:	

Operational Safety Objectives (OSOs)		**SAIL II expected level of robustness**	**Criteria in SORA for SAIL II**	**Requirements applicable to STS-02**
			– a clear distribution and assignment of tasks and – an internal checklist to ensure staff are performing their assigned tasks.	
	LEVEL of ASSURANCE		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. The adequacy of the contingency and emergency procedures are proved through: – Dedicated flight tests, or – Simulation provided the simulation is proven valid for the intended purpose.	The same considerations as provided for STS-01 apply. The proposed point UAS.STS-02.030(4) of the IA requires the UAS operator to prove the adequacy of the contingency and emergency procedures through dedicated flight tests, or simulations.
Remote crew training (OSO #09, OSO #15 and OSO #22)	LEVEL of INTEGRITY	Low	The competency-based theoretical and practical training ensures knowledge of: i) UAS regulations j) UAS airspace operating principles k) Airmanship and aviation safety l) Human performance limitations m) Meteorology n) Navigation/Charts	The same considerations as provided for STS-01 apply.

Operational Safety Objectives (OSOs)		**SAIL II expected level of robustness**	**Criteria in SORA for SAIL II**	**Requirements applicable to STS-02**
			o) UA knowledge p) Operating procedures and is adequate for the operation.	
	LEVEL of ASSURANCE		Training is self-declared (with evidence available)	The same considerations as provided for STS-01 apply, however, the certificate of completion of practical skills training is for STS-02.
Safe Design: OSO #10 Safe recovery from technical issue & OSO #12 The UAS is designed to manage the deterioration of external systems supporting UAS operations	LEVEL of INTEGRITY	Low	The objective of these OSOs is to complement the technical containment safety requirements by addressing the risk of a fatality occurring while operating over populated areas or gatherings of people. External systems supporting the operation are defined as systems that are not already part of the UAS but are used to: – launch / take-off the UAS, – make pre-flight checks, or – keep the UA within its operational volume (e.g. GNSS, Satellite Systems, Air Traffic Management, UTM).	Not applicable as STS-02 is for operations in a sparsely populated environment.

Operational Safety Objectives (OSOs)		SAIL II expected level of robustness	Criteria in SORA for SAIL II	Requirements applicable to STS-02
			External systems activated/used after the loss of control of the operation are excluded from this definition. When operating over populated areas or gatherings of people, a fatality will not occur from any probable[1] failure[2] of the UAS or any external system supporting the operation. [1] 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.' [2] Some structural or mechanical failures may be excluded from the criterion if it can be shown that these mechanical parts were designed to aviation industry best practices.	
	LEVEL of ASSURANCE		A design and installation appraisal is available. In particular, this appraisal shows that: – the design and installation features (independence, separation and redundancy) satisfy the low integrity criterion;	Not applicable, as STS-02 is for operations in a sparsely populated environment.

Operational Safety Objectives (OSOs)		SAIL II expected level of robustness	Criteria in SORA for SAIL II	Requirements applicable to STS-02
			– particular risks relevant to the ConOps (e.g. hail, ice, snow, electromagnetic interference…) do not violate the independence claims, if any.	
OSO #13 External services supporting UAS operations are adequate for the operation	LEVEL of INTEGRITY	Low	The applicant ensures that the level of performance for any externally provided service necessary for the safety of the flight is adequate for the intended operation. Roles and responsibilities between the applicant and the external service provider are defined.	The same considerations as provided for STS-01 apply.
	LEVEL of ASSURANCE		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 necessarily being available)	The same considerations as provided for STS-01 apply.
OSO #16 Multi-crew coordination	LEVEL of INTEGRITY	Low	– Criterion #1 (Procedures): – Procedure(s) to ensure coordination between the crew members and that robust and effective communication channels is (are) available and at a minimum cover: – assignment of tasks to the crew, – establishment of step-by-step communications.	The same considerations as provided for STS-01 apply, however for STS-02, more detailed information is planned to be issued in the future in the form of guidance material, for aspects such as the communications between the remote pilot and visual observers.

Operational Safety Objectives (OSOs)		SAIL II expected level of robustness	Criteria in SORA for SAIL II	Requirements applicable to STS-02
			– Criterion #2 (Training): Remote crew training covers multi-crew coordination.	
	LEVEL of ASSURANCE		– Criterion #1 (Procedures): – Procedures are not required to be validated against a recognized standard. – The adequacy of the procedures and checklists is declared. – Criterion #2 (Training): – Training is self-declared (with evidence available)	The same considerations as provided for STS-01 apply.
OSO #17 **Remote crew is fit to operate**	LEVEL of INTEGRITY	Low	The applicant has a policy defining how the remote crew can declare themselves fit to operate before conducting any operation.	The same considerations as provided for STS-01 apply.
	LEVEL of ASSURANCE		The policy to define how the remote crew declares themselves fit to operate (before an operation) is documented.	The same considerations as provided for STS-01 apply.
OSO #20 **A Human Factors evaluation has been performed and the HMI found appropriate for the mission**	LEVEL of INTEGRITY	Low	The UAS information and control interfaces are clearly and succinctly presented and do not confuse, cause unreasonable fatigue, or contribute to remote crew errors that could adversely affect the safety of the operation.	The same considerations as provided for STS-01 apply. The requirement regarding the use of electronic means by the visual observer is included in the proposed point UAS.STS-02(10)(b)(v) of the IA.

Operational Safety Objectives (OSOs)		SAIL II expected level of robustness	Criteria in SORA for SAIL II	Requirements applicable to STS-02
			Comments / Notes: *If an electronic means is used to support potential Visual Observers in their role to maintain awareness of the position of the unmanned aircraft, its HMI:* – is sufficient to allow the visual observers to determine the position of the UA during operation; – does *not degrade the visual observer's ability to:* – scan the airspace where the unmanned aircraft is operating for any potential collision hazard; and – maintain *effective communication with the remote pilot at all times.*	
	LEVEL of ASSURANCE		The applicant conducts an evaluation of the UAS considering and addressing human factors to determine whether the HMI is appropriate for the mission. The human-machine interface evaluation is based on engineering evaluations or analyses.	The same considerations as provided for STS-01 apply.
OSO #23 Environmental conditions for safe operations are defined, measurable and adhered to	LEVEL of INTEGRITY	Low	– Criterion #1 (Definition): The environmental conditions for safe operations are defined and reflected in the flight manual or equivalent document. – Criterion #2 (Procedures): Procedures to evaluate the environmental conditions before and during the	The same considerations as provided for STS-01 apply. Moreover, the technical requirements proposed for this purpose for class C5 are also proposed for UAS to be used in STS-02 (class C6).

Operational Safety Objectives (OSOs)		**SAIL II expected level of robustness**	**Criteria in SORA for SAIL II**	**Requirements applicable to STS-02**
			mission (i.e. real-time evaluation) are available and include assessment of the meteorological conditions (METAR, TAFOR, etc.) with a simple recording system. – Criterion #3 (Training): Training covers assessment of meteorological conditions	The proposed theoretical training is the same proposed for STS-01
	LEVEL of ASSURANCE		– Criterion #1 (Definition): The applicant declares that the required level of integrity has been achieved(1). (1) *Supporting evidence may or may not be available* – Criterion #2 (Procedures): See 'level of assurance' for Operational procedures (OSO #08, OSO #11, OSO #14 and OSO #21)" – Criterion #3 (Training): see the 'level of assurance' for remote crew training (OSO #09, OSO #15 and OSO #22)"	The same considerations as provided for STS-01 apply.

Appendix 3: Comment spreadsheet for the draft Opinion

For placing your comments on this document, please use the the Excel spreadsheet ‘Comments to the draft Opinion 'Standard scenarios for UAS operations in the ‘specific’ category' (RMT 0729)’ provided in Appendix 3