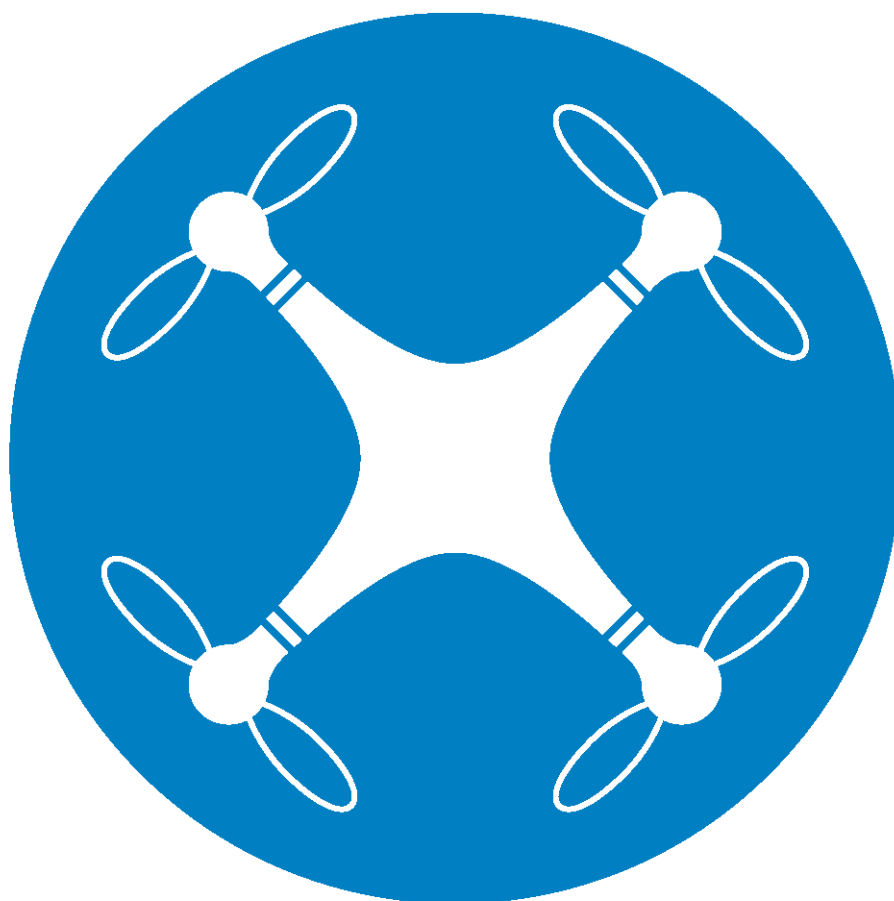


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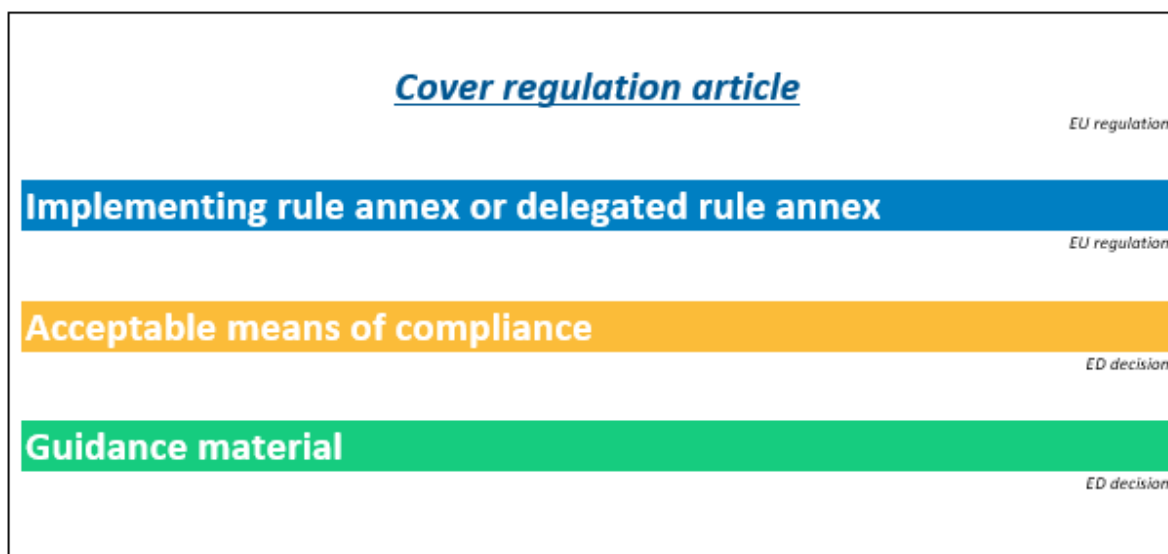
LIST OF REVISIONS

Published	Reason for revision
March 2020	First Easy Access Rules for Unmanned Aircraft Systems (EAR for UAS), powered by eRules. The publication includes: — Commission Implementing Regulation (EU) 2019/947; — Commission Delegated Regulation (EU) 2019/945; and — ED Decision 2019/021/R.
November 2020	This Revision incorporates: — Commission Implementing Regulation (EU) 2020/639; — Commission Delegated Regulation (EU) 2020/1058; and — Commission Implementing Regulation (EU) 2020/746.
January 2021	This Revision introduces ED Decision 2020/022/R into the EAR for UAS.
September 2021	This Revision incorporates Commission Implementing Regulation (EU) 2021/1166.
September 2022	This Revision includes: — Commission Implementing Regulation (EU) 2022/425; and — ED Decision 2022/002/R.
July 2024	It introduces: — Commission Delegated Regulation (EU) 2024/1108; and — Commission Implementing Regulation (EU) 2024/1110.
April 2024	Revision incorporating ED Decision 2023/012/R.
June 2026	Revision incorporating ED Decision 2025/018/R.

NOTE FROM THE EDITOR

The content of this document is arranged as follows: the cover regulation (recitals and articles) of the implementing rule (IR) appears first, then the IR annex points, followed by the related acceptable means of compliance (AMC) and guidance material (GM). As last, comes the delegated rule (DR) and the DR annex points.

All elements (i.e. articles, IRs, DRs, AMC, and GM) are colour-coded and can be identified according to the illustration below. The EU regulation or EASA Executive Director (ED) decision through which the article, IR, DR, AMC, or GM was introduced or last amended is indicated below the article, IR, DR, AMC, or GM title in *italics*.



This document will be updated regularly to incorporate further amendments.

The format of this document has been adjusted to make it user-friendly and for reference purposes. Any comments should be sent to erules@easa.europa.eu.

INCORPORATED AMENDMENTS

IMPLEMENTING RULES (IRs) (COMMISSION REGULATIONS)

Incorporated Commission Regulation	Regulation amendment	Applicability date ¹
Regulation (EU) 2019/947	Initial issue	31/12/2020
Regulation (EU) 2020/639	Amendment 1	2/6/2020
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Regulation (EU) 2021/1166	Amendment 3	5/8/2021
Regulation (EU) 2022/425	Amendment 4	4/4/2022
Regulation (EU) 2024/1110	Amendment 5	1/5/2025

DELEGATED RULES (DRs) (COMMISSION REGULATIONS)

Incorporated Commission Regulation	Regulation amendment	Applicability date
Regulation (EU) 2019/945	Initial issue	1/7/2019
Regulation (EU) 2020/1058	Amendment 1	9/8/2020
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AMC & GM TO IRs (ED DECISIONS)

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ED Decision 2019/021/R	Issue 1	11/10/2019
ED Decision 2020/022/R	Issue 1, Amendment 1	18/12/2020
ED Decision 2022/002/R	Issue 1, Amendment 2	10/2/2022
ED Decision 2023/012/R	Issue 1, Amendment 3	21/10/2023
ED Decision 2025/018/R	Issue 1, Amendment 4	30/9/2025

Note: To access the official versions, please click on the hyperlinks provided above.

¹ This is the main date of application (i.e. the date from which an act or a provision in an act produces its full legal effects) as defined in the relevant cover regulation article. Some provisions of the regulations though may be applicable at a later date (deferred applicability). Besides, there may be some opt-outs (derogations from certain provisions) notified by the Member States.

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LIST OF ABBREVIATIONS

ED Decision 2025/018/R

AEC	airspace encounter category
AEH	airborne electronic hardware
AGL	above ground level
AIP	aeronautical information publication
AMC	acceptable means of compliance
ANSP	air navigation service provider
AO	airspace observer
ARC	air risk class
ATC	air traffic control
ATZ	aerodrome traffic zone
BVLOS	beyond visual line of sight
C2	command and control
C3	command, control and communication
CAA	civil aviation authority
ConOps	concept of operations
COTS	commercial off-the-shelf
CRM	crew resource management
CSP	comprehensive safety portfolio
CTA	controlled aerospace
CTR	controlled traffic region
DAA	detect and avoid
DSSS	direct-sequence spread spectrum
DVR	design verification report
EASA	European Union Aviation Safety Agency
ERM	emergency response manager
ERP	emergency response plan
ERT	emergency response team
EU	European Union
EVLOS	extended visual line of sight
FHSS	frequency-hopping spread spectrum
FIZ	flight information zone
FTB	functional test-based
FTD	flight training device
FTS	flight termination system
GDOP	geometric dilution of precision
GM	guidance material
GNSS	Global Navigation Satellite System
GRC	ground risk class
HF	human factors
HMI	human machine interface
iARC	initial air risk class
ICAO	International Civil Aviation Organization
iGRC	intrinsic ground risk class
ISM	industrial, scientific and medical
JARUS	Joint Authorities for Rulemaking on Unmanned Systems
LACA	low-altitude controlled airspace (below 150 m (500 ft))
MCC	multi-crew cooperation
METAR	aviation routine weather report (in (aeronautical) meteorological code)
MS	Member State
MSO	multiple simultaneous operations
MTOM	maximum take-off mass

NAA	national aviation authority
OFDM	orthogonal frequency-division multiplexing
OM	operations manual
OSO	operational safety objective
PDOP	position dilution of precision
PDRA	predefined risk assessment
RBO	risk-based oversight
RCM	remote crew member
RCP	required communication performance
RF	radio frequency
RLP	required C2 link performance
RMZ	radio mandatory zone
RP	remote pilot
RPS	remote pilot station
SAIL	specific assurance and integrity level
SDS	safety data sheets
SLA	service level agreement
SMM	safety management manual
SMS	safety management system
SORA	specific operations risk assessment
SPECI	aviation selected special weather code in (aeronautical) meteorological code
STS	standard scenario
SW	software
S&A	see and avoid
TAF	terminal area forecast
TCAS	traffic collision avoidance system
TLOS	target level of safety
TMPR	tactical mitigation performance requirement
TMZ	transponder mandatory zone
TOM	take-off mass
UA	unmanned aircraft
UAS	unmanned aircraft system
UAS Regulation	Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft
USSP	U-space service provider
UTM	UAS traffic management
VHL	very-high-level airspace
VLL	very low level
VLOS	visual line of sight
VO	visual observer

COVER REGULATION TO IMPLEMENTING REGULATION (EU) 2019/947

COMMISSION IMPLEMENTING REGULATION (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft systems

Regulation (EU) 2019/947

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 216/2008 and (EC) No 552/2004 of the European Parliament and of the Council and Council Regulation (EEC) No 3922/91¹, and in particular Article 57 thereof,

Whereas:

- (1) Unmanned aircraft, irrespective of their mass, can operate within the same Single European Sky airspace, alongside manned aircraft, whether airplanes or helicopters.
- (2) As for manned aviation, a uniform implementation of and compliance with rules and procedures should apply to operators, including remote pilots, of unmanned aircraft and unmanned aircraft system ('UAS'), as well as for the operations of such unmanned aircraft and unmanned aircraft system.
- (3) Considering the specific characteristics of UAS operations, they should be as safe as those in manned aviation.
- (4) Technologies for unmanned aircraft allow a wide range of possible operations. Requirements related to the airworthiness, the organisations, the persons involved in the operation of UAS and unmanned aircraft operations should be set out in order to ensure safety for people on the ground and other airspace users during the operations of unmanned aircraft.
- (5) The rules and procedures applicable to UAS operations should be proportionate to the nature and risk of the operation or activity and adapted to the operational characteristics of the unmanned aircraft concerned and the characteristics of the area of operations, such as the population density, surface characteristics, and the presence of buildings.
- (6) The risk level criteria as well as other criteria should be used to establish three categories of operations: the 'open', 'specific' and 'certified' categories.
- (7) Proportionate risks mitigation requirements should be applicable to UAS operations according to the level of risk involved, the operational characteristics of the unmanned aircraft concerned and the characteristics of the area of operation.
- (8) Operations in the 'open' category, which should cover operations that present the lowest risks, should not require UAS that are subject to standard aeronautical compliance procedures, but

¹ OJ L 212, 22.8.2018, p. 1.

should be conducted using the UAS classes that are defined in Commission Delegated Regulation (EU) 2019/945¹.

- (9) Operations in the 'specific' category should cover other types of operations presenting a higher risk and for which a thorough risk assessment should be conducted to indicate which requirements are necessary to keep the operation safe.
- (10) A system of declaration by an operator should facilitate the enforcement of this Regulation in case of low risk operations conducted in the 'specific' category for which a standard scenario has been defined with detailed mitigation measures.
- (11) Operations in the 'certified' category should, as a principle, be subject to rules on certification of the operator, and the licensing of remote pilots, in addition to the certification of the aircraft pursuant to Delegated Regulation (EU) 2019/945.
- (12) Whilst mandatory for the 'certified category', for the 'specific' category a certificate delivered by the competent authorities for the operation of an unmanned aircraft, as well as for the personnel, including remote pilots and organisations involved in those activities, or for the aircraft pursuant to Delegated Regulation (EU) 2019/945 could also be required.
- (13) Rules and procedures should be established for the marking and identification of unmanned aircraft and for the registration of operators of unmanned aircraft or certified unmanned aircraft.
- (14) Operators of unmanned aircraft should be registered where they operate an unmanned aircraft which, in case of impact, can transfer, to a human, a kinetic energy above 80 Joules or the operation of which presents risks to privacy, protection of personal data, security or the environment.
- (15) Studies have demonstrated that unmanned aircraft with a take-off mass of 250 g or more would present risks to security and therefore UAS operators of such unmanned aircraft should be required to register themselves when operating such aircraft in the 'open' category.
- (16) Considering the risks to privacy and protection of personal data, operators of unmanned aircraft should be registered if they operate an unmanned aircraft which is equipped with a sensor able to capture personal data. However, this should not be the case when the unmanned aircraft is considered to be a toy within the meaning of Directive 2009/48/EC of the European Parliament and of the Council on the safety of toys².
- (17) The information about registration of certified unmanned aircraft and of operators of unmanned aircraft that are subject to a registration requirement should be stored in digital, harmonised, interoperable national registration systems, allowing competent authorities to access and exchange that information. The mechanisms to ensure the interoperability of the national registers in this Regulation should be without prejudice to the rules applicable to the future repository referred to in Article 74 of Regulation (EU) 2018/1139.
- (18) In accordance with paragraph 8 of Article 56 of Regulation (EU) 2018/1139, this Regulation is without prejudice to the possibility for Member States to lay down national rules to make subject to certain conditions the operations of unmanned aircraft for reasons falling outside the scope of Regulation (EU) 2018/1139, including public security or protection of privacy and personal data in accordance with the Union law.

¹ Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems (see page 1 of this Official Journal).

² Directive 2009/48/EC of the European Parliament and of the Council of 18 June 2009 on the safety of toys (OJ L 170, 30.6.2009, p. 1).

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- (19) National registration systems should comply with the applicable Union and national law on privacy and processing of personal data and the information stored in those registrations systems should be easily accessible¹.
 - (20) UAS operators and remote pilots should ensure that they are adequately informed about applicable Union and national rules relating to the intended operations, in particular with regard to safety, privacy, data protection, liability, insurance, security and environmental protection.
 - (21) Some areas, such as hospitals, gatherings of people, installations and facilities like penal institutions or industrial plants, top-level and higher-level government authorities, nature conservation areas or certain items of transport infrastructure, can be particularly sensitive to some or all types of UAS operations. This should be without prejudice to the possibility for Member States to lay down national rules to make subject to certain conditions the operations of unmanned aircraft for reasons falling outside the scope of this Regulation, including environmental protection, public security or protection of privacy and personal data in accordance with the Union law.
 - (22) Unmanned aircraft noise and emissions should be minimised as far as possible taking into account the operating conditions and various specific characteristics of individual Member States, such as the population density, where noise and emissions are of concern. In order to facilitate the societal acceptance of UAS operations, Delegated Regulation (EU) 2019/945 includes maximum level of noise for unmanned aircraft operated close to people in the 'open' category. In the 'specific' category there is a requirement for the operator to develop guidelines for its remote pilots so that all operations are flown in a manner that minimises nuisances to people and animals.
 - (23) Current national certificates should be adapted to certificates complying with the requirements of this Regulation.
 - (24) In order to ensure the proper implementation of this Regulation, appropriate transitional measures should be established. In particular, Member States and stakeholders should have sufficient time to adapt their procedures to the new regulatory framework before this Regulation applies.
 - (25) The new regulatory framework for UAS operations should be without prejudice to the applicable environmental and nature protection obligations otherwise stemming from national or Union law.
 - (26) While the 'U-space' system including the infrastructure, services and procedures to guarantee safe UAS operations and supporting their integration into the aviation system is in development, this Regulation should already include requirements for the implementation of three foundations of the U-space system, namely registration, geo-awareness and remote identification, which will need to be further completed.
 - (27) Since model aircraft are considered as UAS and given the good safety level demonstrated by model aircraft operations in clubs and associations, there should be a seamless transition from the different national systems to the new Union regulatory framework, so that model aircraft clubs and associations can continue to operate as they do today, as well as taking into account existing best practices in the Member States.

¹ 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) (OJ L 119, 4.5.2016, p. 1).

- (28) In addition, considering the good level of safety achieved by aircraft of class C4 as provided in Annex to this Regulation, low risk operations of such aircraft should be allowed to be conducted in the 'open' category. Such aircraft, often used by model aircraft operators, are comparatively simpler than other classes of unmanned aircraft and should therefore not be subject to disproportionate technical requirements.
- (29) 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:

Article 1 - Subject matter

Regulation (EU) 2019/947

This Regulation lays down detailed provisions for the operation of unmanned aircraft systems as well as for personnel, including remote pilots and organisations involved in those operations.

GM1 Article 1 Subject matter

ED Decision 2019/021/R

AREAS OF APPLICABILITY OF THE UAS REGULATION

For the purposes of the UAS Regulation, the term 'operation of unmanned aircraft systems' does not include indoor UAS operations. Indoor operations are operations that occur in or into a house or a building (dictionary definition) or, more generally, in or into a closed space such as a fuel tank, a silo, a cave or a mine where the likelihood of a UA escaping into the outside airspace is very low.

Article 2 - Definitions

Regulation (EU) 2024/1110

For the purposes of this Regulation, the following definitions shall apply:

- (1) 'unmanned aircraft system' ('UAS') means an unmanned aircraft, as defined in Article 3(30) of Regulation (EU) 2018/1139, and its control and monitoring unit;
- (2) 'unmanned aircraft system operator' ('UAS operator') means any legal or natural person operating or intending to operate one or more UAS;
- (3) 'assemblies of people' means gatherings where persons are unable to move away due to the density of the people present;
- (4) 'UAS geographical zone' means a portion of airspace established by the competent authority that facilitates, restricts or excludes UAS operations in order to address risks pertaining to safety, privacy, protection of personal data, security or the environment, arising from UAS operations;
- (5) 'robustness' means the property of mitigation measures resulting from combining the safety gain provided by the mitigation measures and the level of assurance and integrity that the safety gain has been achieved;
- (6) 'standard scenario' means a type of UAS operation in the 'specific' category, as defined in [Appendix 1](#) of the Annex, for which a precise list of mitigating measures has been identified in such a way that the competent authority can be satisfied with declarations in which operators declare that they will apply the mitigating measures when executing this type of operation;
- (7) 'visual line of sight operation' ('VLOS') means a type of UAS operation in which, the remote pilot is able to maintain continuous unaided visual contact with the unmanned aircraft, allowing the

- remote pilot to control the flight path of the unmanned aircraft in relation to other aircraft, people and obstacles for the purpose of avoiding collisions;
- (8) 'beyond visual line of sight operation' ('BVLOS') means a type of UAS operation which is not conducted in VLOS;
- (9) 'light UAS operator certificate' ('LUC') means a certificate issued to a UAS operator by a competent authority as set out in part C of the Annex;
- (10) 'model aircraft club or association' means an organisation legally established in a Member State for the purpose of conducting leisure flights, air displays, sporting activities or competition activities using UAS;
- (11) 'dangerous goods' means articles or substances, which are capable of posing a hazard to health, safety, property or the environment in the case of an incident or accident, that the unmanned aircraft is carrying as its payload, including in particular:
- (a) explosives (mass explosion hazard, blast projection hazard, minor blast hazard, major fire hazard, blasting agents, extremely insensitive explosives);
 - (b) gases (flammable gas, non-flammable gas, poisonous gas, oxygen, inhalation hazard);
 - (c) flammable liquids (flammable liquids; combustible, fuel oil, gasoline);
 - (d) flammable solids (flammable solids, spontaneously combustible solids, dangerous when wet);
 - (e) oxidising agents and organic peroxides;
 - (f) toxic and infectious substances (poison, biohazard);
 - (g) radioactive substances;
 - (h) corrosive substances;
- (12) 'payload' means instrument, mechanism, equipment, part, apparatus, appurtenance, or accessory, including communications equipment, that is installed in or attached to the aircraft and is not used or intended to be used in operating or controlling an aircraft in flight, and is not part of an airframe, engine, or propeller;
- (13) 'direct remote identification' means a system that ensures the local broadcast of information about a unmanned aircraft in operation, including the marking of the unmanned aircraft, so that this information can be obtained without physical access to the unmanned aircraft;
- (14) 'follow-me mode' means a mode of operation of a UAS where the unmanned aircraft constantly follows the remote pilot within a predetermined radius;
- (15) 'geo-awareness' means a function that, based on the data provided by Member States, detects a potential breach of airspace limitations and alerts the remote pilots so that they can take immediate and effective action to prevent that breach;
- (16) 'privately built UAS' means a UAS assembled or manufactured for the builder's own use, not including UAS assembled from sets of parts placed on the market as a single ready-to-assemble kit;
- (17) 'autonomous operation' means an operation during which an unmanned aircraft operates without the remote pilot being able to intervene;
- (18) '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;

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- (19) 'making available on the market' means any supply of a product for distribution, consumption or use on the Union market in the course of a commercial activity, whether in exchange of payment or free of charge;
 - (20) 'placing on the market' means the first making available of a product on the Union market;
 - (21) 'controlled ground area' means the ground area where the UAS is operated and within which the UAS operator can ensure that only involved persons are present;
 - (22) 'maximum take-off mass' ('MTOM') means the maximum Unmanned Aircraft mass, including payload and fuel, as defined by the manufacturer or the builder, at which the Unmanned Aircraft can be operated;
 - (23) 'unmanned sailplane' means an unmanned aircraft that is supported in flight by the dynamic reaction of the air against its fixed lifting surfaces, the free flight of which does not depend on an engine. It may be equipped with an engine to be used in case of emergency.
 - (24) 'unmanned aircraft observer' means a person, positioned alongside the remote pilot, who, by unaided visual observation of the unmanned aircraft, assists the remote pilot in keeping the unmanned aircraft in VLOS and safely conducting the flight;
 - (25) 'airspace 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;
 - (26) 'control and monitoring unit (CMU)' means the equipment to control and monitor unmanned aircraft remotely as defined in point (32) of Article 3 of Regulation (EU) 2018/1139;
 - (27) 'C2 link' means the data link between the UA and the CMU for the purpose of managing the flight;
 - (28) '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 described in point (6)(c) of [Appendix 5](#) to the Annex;
 - (29) 'flight geography area' means the projection of the flight geography on the surface of the earth;
 - (30) 'contingency volume' means the volume of airspace outside the flight geography where contingency procedures described in point (6)(d) of [Appendix 5](#) to the Annex are applied;
 - (31) 'contingency area' means the projection of the contingency volume on the surface of the earth;
 - (32) 'operational volume' is the combination of the flight geography and the contingency volume;
 - (33) 'ground risk buffer' is an area over the surface of the earth, which surrounds the operational volume and that is specified in order to minimise the risk to third parties on the surface in the event of the unmanned aircraft leaving the operational volume.
 - (34) 'night' means the hours between the end of evening civil twilight and the beginning of morning civil twilight as defined in Implementing Regulation (EU) No 923/2012 ¹.
 - (35) 'UAS component' means any engine, propeller or part of the UA, or any element of the control and monitoring unit (CMU).

¹ Commission Implementing Regulation (EU) No 923/2012 of 26 September 2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation and amending Implementing Regulation (EU) No 1035/2011 and Regulations (EC) No 1265/2007, (EC) No 1794/2006, (EC) No 730/2006, (EC) No 1033/2006 and (EU) No 255/2010, (OJ L 281, 13.10.2012, p.1).

GM1 Article 2(3) Definitions

ED Decision 2019/021/R

DEFINITION OF 'ASSEMBLIES OF PEOPLE'

Assemblies of people have been defined by an objective criterion related to the possibility for an individual to move around in order to limit the consequences of an out-of-control UA. It was indeed difficult to propose a number of people above which this group of people would turn into an assembly of people: numbers were indeed proposed, but they showed quite a large variation. Qualitative examples of assemblies of people are:

- (a) sport, cultural, religious or political events;
- (b) beaches or parks on a sunny day;
- (c) commercial streets during the opening hours of the shops; and
- (d) ski resorts/tracks/lanes.

AMC1 Article 2(11) Definitions

ED Decision 2022/002/R

DEFINITION OF 'DANGEROUS GOODS'

'Dangerous goods' should be considered any articles or substances which are capable of posing a hazard to health, safety, property or the environment, and which are listed as dangerous goods in the ICAO *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (ICAO Doc 9284), known as the 'Technical Instructions', or which are classified as such according to the Technical Instructions.

GM1 Article 2(11) Definitions

ED Decision 2022/002/R

DEFINITION OF 'DANGEROUS GOODS'

The definition of 'dangerous goods' in [Article 2\(11\)](#) of the UAS Regulation stems from the definition and classification of 'dangerous goods' in the ICAO Technical Instructions. ICAO Advisory Circular (AC) 102-37, Revision 0, issued on 23 June 2020, contains further information.

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

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

Blood for transfusion and medical samples that are not subject to the provisions of the Technical Instructions may be transported in the 'open', 'specific', or 'certified' categories.

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

Articles and substances which would otherwise be classified as dangerous goods (e.g. fuel, batteries and other goods used during the flight to supply energy to the drone's system) but which are required to be on board the aircraft for the propulsion of the UAS or for the operation of its specialised

equipment during transport, or which are required in accordance with the pertinent operating requirements should not be considered as transported dangerous goods and their safety should be verified during the design verification of the UAS.

GM1 Article 2(16) Definitions

ED Decision 2022/002/R

DEFINITION OF 'PRIVATELY BUILT UAS'

A UAS is considered privately built when it is manufactured or assembled by the operator for their own use and not placed on the market (i.e. there is no offer or agreement (written or verbal) for the transfer of its ownership or any other property right). In the context of this definition, the terms 'assembled' or 'manufactured' by the operator concerns one of the following actions:

- (a) the complete manufacturing of the UAS, or at least the most of it;
- (b) the assembly of the UAS from parts or sub-assemblies sold separately;
- (c) the modification of a class C4 UAS (aeromodel).

A change of one or a few components of a UAS bearing a class identification label (apart from a C4 UAS) does not qualify it as a privately built UAS, unless the change is described in the manufacturer's instructions. For more information, please refer to [AMC1 UAS.OPEN.020\(5\)\(c\) and \(d\)](#), [UAS.OPEN.030\(3\)](#) and [UAS.OPEN.040\(4\)\(c\), \(d\) and \(e\)](#).

A UAS assembled from the elements provided in a 'ready-to-assemble kit' is also not considered 'privately built'.

GM1 Article 2(17) Definitions

ED Decision 2019/021/R

DEFINITION OF 'AUTONOMOUS OPERATION'

Flight phases during which the remote pilot has no ability to intervene in the course of the aircraft, either following the implementation of emergency procedures, or due to a loss of the command-and-control connection, are not considered autonomous operations.

An autonomous operation should not be confused with an automatic operation, which refers to an operation following pre-programmed instructions that the UAS executes while the remote pilot is able to intervene at any time.

GM1 Article 2(18) Definitions

ED Decision 2022/002/R

DEFINITION OF 'UNINVOLVED PERSONS'

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

An uninvolved person is a person that does not take part in the UAS operation, either directly or indirectly, and that could be potentially affected by the UAS operation. Persons protected by a shelter (e.g. a roof) are not considered to be affected by the UAS operation nor exposed to direct risks if the MTOM of the UA is below 25 kg or if the UA complies with the conditions defined in criterion #2 of mitigation M1 of the SORA (refer to point B.2 of [Annex B to the SORA](#)).

People that sit at a beach or in a park, or walk on a street or on a road, are also generally considered uninvolved persons.

A person may be considered to be 'involved' in the UAS operation when the following conditions are met.

Before the flight, the person:

- (a) has given explicit consent (it may be verbal) to the UAS operator or to the remote pilot to be part of the UAS operation (even indirectly as a spectator or just accepting to be overflown by the UAS); and
- (b) has received from the UAS operator or from the remote pilot clear instructions and safety precautions to follow in case the UAS exhibits any unplanned behaviour.

UAS operators are responsible for ensuring that all persons involved are able to follow in a timely manner the emergency procedures.

In principle, in order to be considered a 'person involved', one:

- (a) is able to decide whether or not to participate in the UAS operation;
- (b) broadly understands the risks involved;
- (c) has reasonable safeguards during the UAS operations, introduced by the site manager and the aircraft operator; and
- (d) is not restricted from taking part in the event or activity if they decide not to participate in the UAS operation.

The person involved is expected to follow the directions and safety precautions provided by the UAS operator or the remote pilot, and the UAS operator or the remote pilot should check by asking simple questions to make sure that the directions and safety precautions have been properly understood.

It should be reminded that UAS operations over assemblies of people (e.g. sport activities or other mass public events) are never allowed in the 'open' category. These operations may be classified as falling into the 'specific' or 'certified' category, depending on the risk involved. Spectators or any other people gathered for sport activities or other mass public events for which the UAS operation is not the primary focus are generally considered 'uninvolved persons'.

An example: when filming with a UAS at a large music festival or public event, it is not sufficient to inform the audience or anyone present via a public address system, or via a statement on the ticket, or in advance by email or text message. Those types of communication channels do not satisfy the points above. In order to be considered a person involved, each person should be asked for their permission and be made aware of the possible risk(s).

GM1 Article 2(21) Definitions

ED Decision 2022/002/R

DEFINITION OF 'CONTROLLED GROUND AREA'

'Controlled ground area' is an area on the ground (on the surface of the Earth) where the UAS operator is able to ensure that only the persons involved are present. Such area comprises the 'flight geography area', the 'contingency area' and the 'ground risk buffer'. The UAS operator may protect the controlled ground area by means of fencing or using other methods, as appropriate, considering the population density.

GM1 Article 2(22) Definitions

ED Decision 2019/021/R

DEFINITION OF 'MAXIMUM TAKE-OFF MASS (MTOM)'

This MTOM is the maximum mass defined by the manufacturer or the builder, in the case of privately built UAS, which ensures the controllability and mechanical resistance of the UA when flying within the operational limits.

The MTOM should include all the elements on board the UA:

- (a) all the structural elements of the UA;
- (b) the motors;
- (c) the propellers, if installed;
- (d) all the electronic equipment and antennas;
- (e) the batteries and the maximum capacity of fuel, oil and all fluids; and
- (f) the heaviest payload allowed by the manufacturer, including sensors and their ancillary equipment.

GM1 Article 2(25) Definitions

ED Decision 2022/002/R

RESPONSIBILITIES OF THE AIRSPACE OBSERVER (AO)

The employment of AOs is not limited to operations covered by STSs — they can be employed also in other operations under the 'specific' category. The AO's main responsibilities, as defined in point [UAS.STS-02.050](#), are to:

- (1) maintain a thorough visual scan of the airspace surrounding the unmanned aircraft (UA) in order to identify any risk of collision with any manned aircraft;
- (2) maintain awareness of the position of the UA through visual contact or through assistance provided by electronic means;
- (3) alert the remote pilot when a hazard is detected and assist in avoiding or minimising the potential negative effects.

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

ED Decision 2022/002/R

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

The '**flight geography**' is the spatially and temporally defined volume of airspace in which the UAS operator plans to conduct the operation under normal procedures; the projection of such volume on the surface of the Earth constitutes the '**flight geography area**'. Additionally, the UA positioning errors must be accounted for in the definition of this area.

To cope with abnormal situations (e.g. navigation errors, UA drifting due to wind/gusts, etc.), the UAS operator should define the '**contingency volume**' as an airspace volume where contingency procedures are applied in order to bring the UA back to a normal situation within the 'flight geography' (for example, if the UA exits the boundaries of the flight geography, the remote pilot should take actions to pilot the UAS back into the flight geography. If the contingency situation persists, the remote

pilot should activate the FTS (if available) before the UAS exits the contingency volume). The projection of the contingency volume on the surface of the Earth is the **'contingency area'**.

The **'operational volume'** includes the 'flight geography' and the 'contingency volume'. To define the operational volume, the UAS operator should consider the position-keeping capabilities of the UAS in a 4D space (latitude, longitude, height, and time).

The accuracy of the navigation solution, the flight technical error of the UAS, as well as the path definition error (e.g. map error) and latencies should be considered and addressed in defining the operational volume. For navigation errors: the UAS operator should take into account that such errors are determined by the interaction of several contributes, like positioning sensors providing position, navigation and flight control systems, system and human latencies, and environment.

The UAS operator should, therefore, establish sufficient margins to cater for such errors.

The **'ground risk buffer'** is the area on the surface of the Earth surrounding the operational volume, which is defined by the UAS operator to minimise the risk to third parties on the surface in case the UA leaves the operational volume (i.e. the area the UA is expected to impact if its FTS is triggered when the UA leaves the operational volume). Point 2.3.1(c)(3) of [AMC1 to Article 11 \(SORA\)](#) provides additional information.

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

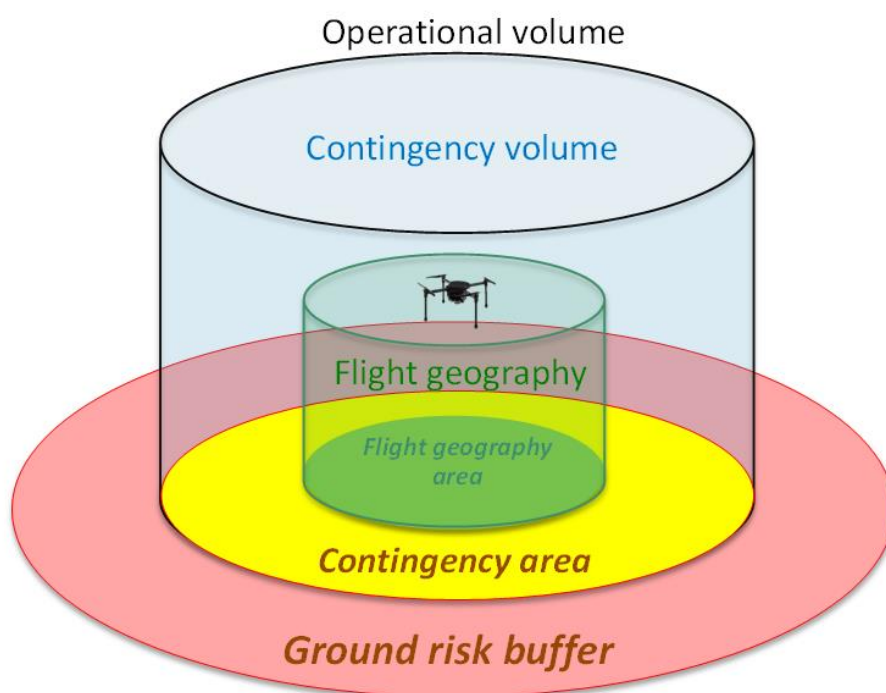


Figure 1 — Relation between 'flight geography', 'flight geography area', 'contingency area', 'operational volume' and 'ground risk buffer'

Article 3 - Categories of UAS operations

Regulation (EU) 2019/947

UAS operations shall be performed in the 'open', 'specific' or 'certified' category defined respectively in Articles 4, 5 and 6, subject to the following conditions:

- (a) UAS operations in the 'open' category shall not be subject to any prior operational authorisation, nor to an operational declaration by the UAS operator before the operation takes place;
- (b) UAS operations in the 'specific' category shall require an operational authorisation issued by the competent authority pursuant to Article 12 or an authorisation received in accordance with Article 16, or, under circumstances defined in Article 5(5), a declaration to be made by a UAS operator;
- (c) UAS operations in the 'certified' category shall require the certification of the UAS pursuant to Delegated Regulation (EU) 2019/945 and the certification of the operator and, where applicable, the licensing of the remote pilot.

GM1 Article 3 Categories of UAS operations

ED Decision 2019/021/R

BOUNDARIES BETWEEN THE CATEGORIES OF UAS OPERATIONS

- (a) Boundary between 'open' and 'specific'

A UAS operation does not belong to the 'open' category when at least one of the general criteria listed in Article 4 of the UAS Regulation is not met (e.g. when operating beyond visual line of sight (BVLOS)) or when the detailed criteria for a subcategory are not met (e.g. operating a 10 kg UA close to people when subcategory A2 is limited to 4 kg UA).

- (b) Boundary between 'specific' and 'certified'

Article 6 of the UAS Regulation and Article 40 of Regulation (EU) 2019/945 define the boundary between the 'specific' and the 'certified' category. The first article defines the boundary from an operational perspective, while the second one defines the technical characteristics of the UA, and they should be read together.

A UAS operation belongs to the 'certified' category when, based on the risk assessment, the competent authority considers that the risk cannot be mitigated adequately without the:

- certification of the airworthiness of the UAS;
- certification of the UAS operator; and
- licensing of the remote pilot, unless the UAS is fully autonomous.

UAS operations are always considered to be in the 'certified' category when they:

- are conducted over assemblies of people with a UA that has characteristic dimensions of 3 m or more; or
- involve the transport of people; or
- involve the carriage of dangerous goods that may result in a high risk for third parties in the event of an accident.

Article 4 - 'Open' category of UAS operations

Regulation (EU) 2019/947

1. Operations shall be classified as UAS operations in the 'open' category only where the following requirements are met:
 - (a) the UAS belongs to one of the classes set out in Delegated Regulation (EU) 2019/945 or is privately built or meets the conditions defined in Article 20;
 - (b) the unmanned aircraft has a maximum take-off mass of less than 25 kg;
 - (c) the remote pilot ensures that the unmanned aircraft is kept at a safe distance from people and that it is not flown over assemblies of people;
 - (d) the remote pilot keeps the unmanned aircraft in VLOS at all times except when flying in follow-me mode or when using an unmanned aircraft observer as specified in Part A of the Annex;
 - (e) during flight, the unmanned aircraft is maintained within 120 metres from the closest point of the surface of the earth, except when overflying an obstacle, as specified in Part A of the Annex
 - (f) during flight, the unmanned aircraft does not carry dangerous goods and does not drop any material;
2. UAS operations in the 'open' category shall be divided in three sub-categories in accordance with the requirements set out in Part A of the Annex.

Article 5 - 'Specific' category of UAS operations

Commission Implementing Regulation (EU) 2021/1166

1. Where one of the requirements laid down in [Article 4](#) or in Part A of the Annex is not met, a UAS operator shall be required to obtain an operational authorisation pursuant to [Article 12](#) from the competent authority in the Member State where it is registered.
2. When applying to a competent authority for an operational authorisation pursuant [Article 12](#), the operator shall perform a risk assessment in accordance with [Article 11](#) and submit it together with the application, including adequate mitigating measures.
3. In accordance with point [UAS.SPEC.040](#) laid down in Part B of the Annex, the competent authority shall issue an operational authorisation, if it considers that the operational risks are adequately mitigated in accordance with [Article 12](#).
4. The competent authority shall specify whether the operational authorisation concerns:
 - (a) the approval of a single operation or a number of operations specified in time or location(s) or both. The operational authorisation shall include the associated precise list of mitigating measures;
 - (b) the approval of an LUC, in accordance with part C of the Annex.
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 set out 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.

6. An operational authorisation or a declaration shall not be required for:
- (a) UAS operators holding an LUC with appropriate privileges in accordance with point [UAS.LUC.060](#) of the Annex;
 - (b) operations conducted in the framework of model aircraft clubs and associations that have received an authorisation in accordance with [Article 16](#).

AMC1 Article 5 ‘Specific’ category of UAS operations

ED Decision 2022/002/R

TRANSPORT OF DANGEROUS GOODS IN THE ‘SPECIFIC’ CATEGORY

- (a) Dangerous goods may be transported in the ‘specific’ category of UAS operations only if the UAS operator is able to demonstrate that these goods will not cause harm or damage to third parties or to the environment in case of accident. When compatible with the operation, a crash-protected container, which will prevent the leakage/dispersion of dangerous goods in case of accident, would be acceptable. In this case, the UAS operator should demonstrate that the container is capable of maintaining/protecting the dangerous goods without causing damage or harm to third parties or the environment in case of accident. In demonstrating the conformity of the container, the operational characteristics of the flight (flight speed, altitude, weather conditions, etc.) shall be taken into account, as well as the defining aspects of the geographical area of operation.
- (b) The assessment of the operational risk of transporting dangerous goods should take into account the following:
 - (1) the risk that such goods pose to persons that are directly involved in their handling, to the environment, and to third parties and their properties;
 - (2) the hazard posed by the quantity and class of the dangerous goods;
 - (3) the characteristics of the container for the dangerous goods;
 - (4) the level of competence of those handling the dangerous goods; and
 - (5) the geographical area in which the flight will be operated.
- (c) The UAS operator that wishes to carry out operations in the ‘specific’ category to transport dangerous goods should establish a dangerous goods training programmes for the personnel involved, as required by the Technical Instructions. Such training programmes should be commensurate with the responsibilities of the personnel involved in those operations. The training programmes should be subject to review and approval by the competent authority, and should cover at least the following aspects:
 - (1) dangerous goods terminology;
 - (2) classification of dangerous goods;
 - (3) labelling of dangerous goods;
 - (4) identification of dangerous goods that use ‘SDSs’ and the Globally Harmonised System of Classification and Labelling of Chemicals (GHS) consumer labelling;
 - (5) use of the dangerous goods list provided in the Technical Instructions;
 - (6) storage and handling of dangerous goods, including but not limited to the segregation of incompatible dangerous goods, dangerous goods loading, and dangerous goods securing;
 - (7) instructions and safety precautions to be provided to employees and third parties; and

- (8) emergency/reporting procedures included in the ERP in case of an accident/incident with dangerous goods.

Article 6 - 'Certified' category of UAS operations

Regulation (EU) 2019/947

1. Operations shall be classified as UAS operations in the 'certified' category only where the following requirements are met:
 - (a) the UAS is certified pursuant to points (a), (b) and (c) of paragraph 1 of Article 40 of Delegated Regulation (EU) 2019/945; and
 - (b) the operation is conducted in any of the following conditions:
 - i. over assemblies of people;
 - ii. involves the transport of people;
 - iii. involves the carriage of dangerous goods, that may result in high risk for third parties in case of accident.
2. In addition, UAS operations shall be classified as UAS operations in the 'certified' category where the competent authority, based on the risk assessment provided for in Article 11, considers that the risk of the operation cannot be adequately mitigated without the certification of the UAS and of the UAS operator and, where applicable, without the licensing of the remote pilot.

GM1 Article 6 'Certified' category of UAS operations

ED Decision 2019/021/R

UAS OPERATIONS IN THE 'CERTIFIED' CATEGORY

Article 6 of the UAS Regulation should be read together with Article 40 of Regulation (EU) 2019/945 — Article 6 addresses UAS operations and Article 40 addresses the UAS. This construction was necessary to respect the EU legal order reflected in Regulation (EU) 2018/1139, which foresees that the requirements for UAS operations and registration are in the implementing act, and that the technical requirements for UAS are in the delegated act. The reading of the two articles results in the following:

- (a) the transport of people is always in the 'certified' category. Indeed, the UAS must be certified in accordance with Article 40 and the transport of people is one of the UAS operations identified in Article 6 as being in the 'certified' category;
- (b) flying over assemblies of people with a UAS that has a characteristic dimension of less than 3 m may be in the 'specific' category unless the risk assessment concludes that it is in the 'certified' category; and
- (c) the transport of dangerous goods is in the 'certified' category if the payload is not in a crash-protected container, such that there is a high risk for third parties in the case of an accident.

Article 7 - Rules and procedures for the operation of UAS

Regulation (EU) 2024/1110

1. UAS operations in the ‘open’ category shall comply with the operational limitations set out in Part A of the Annex.
2. UAS operations in the ‘specific’ category shall comply with the operational limitations set out in the operational authorisation as referred to in Article 12 or the authorisation as referred to in Article 16, or in a standard scenario defined in Appendix 1 to the Annex as declared by the UAS operator.

This paragraph shall not apply where the UAS operator holds an LUC with appropriate privileges.

UAS operations in the ‘specific’ category shall be subject to the applicable operational requirements laid down in Commission Implementing Regulation (EU) No 923/2012¹.

- 2a. The operator of a UAS that meets the conditions specified in point 1(d) of Article 40 of Delegated Regulation (EU) 2019/945 shall obtain the following certificates:
 - (i) a certificate of airworthiness or a restricted certificate of airworthiness issued in accordance with Subpart H of Annex I (Part 21) to Commission Regulation (EU) No 748/2012;
 - (ii) a noise certificate issued in accordance with Subpart I of Annex I (Part 21) to Commission Regulation (EU) No 748/2012 when the UA is subject to the environmental protection requirements laid down in point 21.B.85 of Regulation (EU) No 748/2012.
3. UAS operations in the ‘certified’ category shall be subject to the applicable operational requirements laid down in Implementing Regulation (EU) No 923/2012 and Commission Regulations (EU) No 965/2012³ and (EU) No 1332/2011⁴.

Article 8 - Rules and procedures for the competency of remote pilots

Regulation (EU) 2019/947

1. Remote pilots operating UAS in the ‘open’ category shall comply with the competency requirements set in Part A of the Annex.
2. Remote pilots operating UAS in the ‘specific’ category shall comply with the competency requirements set out in the operational authorisation by the competent authority or in the standard scenario defined in Appendix 1 to the Annex or as defined by the LUC and shall have at least the following competencies:
 - (a) ability to apply operational procedures (normal, contingency and emergency procedures, flight planning, pre-flight and post-flight inspections);

¹ Commission Implementing Regulation (EU) No 923/2012 of 26 September 2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation and amending Implementing Regulation (EU) No 1035/2011 and Regulations (EC) No 1265/2007, (EC) No 1794/2006, (EC) No 730/2006, (EC) No 1033/2006 and (EU) No 255/2010 (OJ L 281, 13.10.2012, p. 1).

² Commission Regulation (EU) No 748/2012 of 3 August 2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations (recast) (OJ L 224, 21.8.2012, p. 1, ELI: <http://data.europa.eu/eli/reg/2012/748/oj>)

³ Commission Regulation (EU) No 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No 216/2008 of the European Parliament and of the Council (OJ L 296, 25.10.2012, p. 1).

⁴ Commission Regulation (EU) No 1332/2011 of 16 December 2011 laying down common airspace usage requirements and operating procedures for airborne collision avoidance (OJ L 336, 20.12.2011, p. 20).

- (b) ability to manage aeronautical communication;
 - (c) manage the unmanned aircraft flight path and automation;
 - (d) leadership, teamwork and self-management;
 - (e) problem solving and decision-making;
 - (f) situational awareness;
 - (g) workload management;
 - (h) coordination or handover, as applicable.
3. Remote pilots operating in the framework of model aircraft clubs or associations shall comply with the minimum competency requirements defined in the authorisation granted in accordance with Article 16.

Article 9 - Minimum age for remote pilots

Regulation (EU) 2019/947

1. The minimum age for remote pilots operating a UAS in the 'open' and 'specific' category shall be 16 years.
2. No minimum age for remote pilots shall be required:
 - (a) when they operate in subcategory A1 as specified in Part A of the Annex to this Regulation, with a UAS Class C0 defined in Part 1 of the Annex to Delegated Regulation (EU) 2019/945 that is a toy within the meaning of Directive 2009/48/EC;
 - (b) for privately-built UAS with a maximum take-off mass of less than 250g;
 - (c) when they operate under the direct supervision of a remote pilot complying with paragraph 1 and Article 8.
3. Member States may lower the minimum age following a risk-based approach taking into account specific risks associated with the operations in their territory:
 - (a) for remote pilots operating in the 'open' category by up to 4 years;
 - (b) for remote pilots operating in the 'specific' category by up to 2 years.
4. Where a Member State lowers the minimum age for remote pilots, those remote pilots shall only be allowed to operate a UAS on the territory of that Member State.
5. Member States may define a different minimum age for remote pilots operating in the framework of model aircraft clubs or associations in the authorisation issued in accordance with Article 16.

GM1 Article 9 Minimum age for remote pilots

ED Decision 2019/021/R

SUPERVISOR

A person may act as a remote pilot even if he or she has not reached the minimum age defined in Article 9(1) of the UAS Regulation, provided that the person is supervised. The supervising remote pilot must, in any case, comply with the age requirement specified in that Article. The possibility to lower the minimum age applies only to remote pilots (and not to supervisors). Since the supervisor and the young remote pilot must both demonstrate competency to act as a remote pilot, no minimum

age is defined to conduct the training and pass the test to demonstrate the minimum competency to act as a remote pilot in the 'open' category.

Article 10 - Rules and procedures for the airworthiness of UAS

Regulation (EU) 2019/947

Unless privately-built, or used for operations referred to in Article 16, or meeting the conditions defined in Article 20, UAS used in operations set out in this Regulation shall comply with the technical requirements and rules and procedures for the airworthiness defined in the delegated acts adopted pursuant to Article 58 of Regulation (EU) 2018/1139.

Article 11 - Rules for conducting an operational risk assessment

Regulation (EU) 2019/947

1. An operational risk assessment shall:
 - (a) describe the characteristics of the UAS operation;
 - (b) propose adequate operational safety objectives;
 - (c) identify the risks of the operation on the ground and in the air considering all of the below:
 - i. the extent to which third parties or property on the ground could be endangered by the activity;
 - ii. the complexity, performance and operational characteristics of the unmanned aircraft involved;
 - iii. the purpose of the flight, the type of UAS, the probability of collision with other aircraft and class of airspace used;
 - iv. the type, scale, and complexity of the UAS operation or activity, including, where relevant, the size and type of the traffic handled by the responsible organisation or person;
 - v. the extent to which the persons affected by the risks involved in the UAS operation are able to assess and exercise control over those risks.
 - (d) identify a range of possible risk mitigating measures;
 - (e) determine the necessary level of robustness of the selected mitigating measures in such a way that the operation can be conducted safely.
2. The description of the UAS operation shall include at least the following:
 - (a) the nature of the activities performed;
 - (b) the operational environment and geographical area for the intended operation, in particular overflown population, orography, types of airspace, airspace volume where the operation will take place and which airspace volume is kept as necessary risk buffers, including the operational requirements for geographical zones;
 - (c) the complexity of the operation, in particular which planning and execution, personnel competencies, experience and composition, required technical means are planned to conduct the operation;
 - (d) the technical features of the UAS, including its performance in view of the conditions of the planned operation and, where applicable, its registration number;

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- (e) the competence of the personnel for conducting the operation including their composition, role, responsibilities, training and recent experience.
 - 3. The assessment shall propose a target level of safety, which shall be equivalent to the safety level in manned aviation, in view of the specific characteristics of UAS operation.
 - 4. The identification of the risks shall include the determination of all of the below:
 - (a) the unmitigated ground risk of the operation taking into account the type of operation and the conditions under which the operation takes place, including at least the following criteria:
 - i. VLOS or BVLOS;
 - ii. population density of the overflowed areas;
 - iii. flying over an assembly of people;
 - iv. the dimension characteristics of the unmanned aircraft;
 - (b) the unmitigated air risk of the operation taking into account all of the below:
 - i. the exact airspace volume where the operation will take place, extended by a volume of airspace necessary for contingency procedures;
 - ii. the class of the airspace;
 - iii. the impact on other air traffic and air traffic management (ATM) and in particular:
 - the altitude of the operation;
 - controlled versus uncontrolled airspace;
 - aerodrome versus non-aerodrome environment;
 - airspace over urban versus rural environment;
 - separation from other traffic.
 - 5. The identification of the possible mitigation measures necessary to meet the proposed target level of safety shall consider the following possibilities:
 - (a) containment measures for people on the ground;
 - (b) strategic operational limitations to the UAS operation, in particular:
 - i. restricting the geographical volumes where the operation takes place;
 - ii. restricting the duration or schedule of the time slot in which the operation takes place;
 - (c) strategic mitigation by common flight rules or common airspace structure and services;
 - (d) capability to cope with possible adverse operating conditions;
 - (e) organisation factors such as operational and maintenance procedures elaborated by the UAS operator and maintenance procedures compliant with the manufacturer's user manual;
 - (f) the level of competency and expertise of the personnel involved in the safety of the flight;
 - (g) the risk of human error in the application of the operational procedures;
 - (h) the design features and performance of the UAS in particular:

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- i. the availability of means to mitigate risks of collision;
 - ii. the availability of systems limiting the energy at impact or the frangibility of the unmanned aircraft;
 - iii. the design of the UAS to recognised standards and the fail-safe design.
 6. The robustness of the proposed mitigating measures shall be assessed in order to determine whether they are commensurate with the safety objectives and risks of the intended operation, particularly to make sure that every stage of the operation is safe.

GM1 AMC1 Article 11 Rules for conducting an operational risk assessment

ED Decision 2025/018/R

GENERAL

The operational risk assessment required by [Article 11 of the UAS Regulation](#) may be conducted using the methodology described in [AMC1 Article 11](#). This methodology is basically the specific operations risk assessment (SORA) developed by JARUS. Other methodologies might be used by the UAS operator as alternative means of compliance.

Unmanned free balloons are unmanned aircraft and shall thus comply with Regulation (EU) 2019/947. For this type of aircraft, compliance with Appendix 2 to Regulation (EU) No 923/2012 is considered an acceptable means of compliance with [Article 11](#).

Aspects other than safety, such as security, privacy, environmental protection, the use of the radio frequency (RF) spectrum, etc., should be assessed in accordance with the applicable requirements established by the Member State in which the operation is intended to take place, or by other EU regulations.

For some UAS operations that are classified as being in the 'specific' category, alternatives to carrying out a full risk assessment are offered to UAS operators:

- (a) for UAS operations with lower intrinsic risks, a declaration may be submitted when the operations comply with the standard scenarios (STSs) listed in [Appendix 1 to the UAS Regulation](#). Table 1 provides a summary of the STSs; and
- (b) for other UAS operations, a request for authorisation may be submitted based on the mitigations and provisions described in the predefined risk assessment (PDRA) when the UAS operation meets the operational characterisation described in [AMC2 et seq. Article 11 to the UAS Regulation](#). Table 2 below provides a summary of the PDRAs that have been published so far.

While the STSs are described in a detailed way, the provisions and mitigations in the PDRAs are described in a rather generic way to provide flexibility to UAS operators and the competent authorities to establish more prescriptive limitations and provisions that are adapted to the particularities of the intended operations. Two types of PDRAs are provided:

- those derived from an STS, which allow the UAS operator to conduct similar operations, but using, for example, UAS without the class label that is mandated by the STS (e.g. privately built UAS); and
- more generic PDRAs.

The codification of a PDRA includes the letter 'G' or 'S' (e.g. PDRA-G01 or PDRA-S01):

- 'G' is used for generic PDRAs.

- ‘S’ is used for PDRAs that are derived from an STS whose level of prescriptiveness is the same as of the corresponding STS. Therefore, those PDRAs, although they address UAS operations that are subject to operational authorisations (to allow the use of UAS without a class label), are expected to provide an even more simplified authorisation process compared to other (non-STs-related) PDRAs. Ideally, for UAS operations that are performed based on those PDRAs, the competent authorities may implement expedited operational-authorisation processes. Those processes may be based on the review of the documentation that is submitted by the UAS operator to support the declaration of compliance with the PDRA provisions.

In accordance with [Article 11 of the UAS Regulation](#), the applicant must collect and provide the relevant technical, operational and system information needed to assess the risk associated with the intended operation of the UAS, and the SORA ([AMC1 Article 11 of the UAS Regulation](#)) provides a detailed framework for such data collection and presentation. The concept of operations (ConOps) description is the foundation for all other activities, and should be as accurate and detailed as possible. The ConOps should not only describe the operation, but also provide insight into the UAS operator’s operational safety culture. It should also include how and when to interact with the air navigation service provider (ANSP) when applicable.

PDRAs only address safety risks; consequently, additional limitations and provisions might need to be included after the consideration of other risks (e.g. security, privacy, etc.).

STS#	Edition/date	UAS characteristics	BVLOS/VLOS	Overflown area	Maximum range from remote pilot	Maximum height	Airspace	Notes
STS-01	June 2020	Bearing a C5 class marking (maximum characteristic dimension of up to 3 m and MTOM of up to 25 kg)	VLOS	Controlled ground area that might be located in a populated area	VLOS	120 m	Controlled or uncontrolled, with low risk of encounter with manned aircraft	
STS-02	June 2020	Bearing a C6 class marking (maximum characteristic dimension of up to 3 m and MTOM of up to 25 kg)	BVLOS	Controlled ground area that is entirely located in a sparsely populated area	2 km with an AO 1 km, if no AO	120 m	Controlled or uncontrolled, with low risk of encounter with manned aircraft	

Table 1 — List of STSs published as ‘Appendix 1 for standard scenarios supporting a declaration’ to the Annex to the UAS Regulation

When UAS operators intend to conduct an operation covered by a PDRA, they should fill in the last two columns of the table related to the selected PDRA, named ‘integrity’ and ‘proof’. In the column ‘integrity’ they should explain how the level of integrity is met, and in the column ‘proof’ how the level of integrity is demonstrated. To support UAS operators, the two columns are already prefilled; however, the UAS operator may adapt the text to their needs.

If the UAS operation does not fit completely within the limits of the PDRA, the UAS operator is required to conduct a full risk assessment and submit it to the competent authority. Changes to the PDRA should not be done, unless the competent authority accepts that minor changes should be made.

PDRA#	Edition/date	UAS characteristics	BVLOS/VLOS	Overflowed area	Maximum range from remote pilot	Maximum height	Airspace	AMC# to Article 11	Notes
PDRA-S01	1.1 / January 2022	Maximum characteristic dimension of up to 3 m and take-off mass of up to 25 kg	VLOS	Controlled ground area that might be located in a populated area	VLOS	150 m	Controlled or uncontrolled, with low risk of encounter with manned aircraft	AMC4	
PDRA-S02	1.1 / January 2022	Maximum characteristic dimension of up to 3 m and take-off mass of up to 25 kg	BVLOS	Controlled ground area that is entirely located in a sparsely populated area	2 km with an AO or with AOs 1 km, if no AO	150 m	Controlled or uncontrolled, with low risk of encounter with manned aircraft	AMC5	
PDRA-G01	1.2 / January 2022	Maximum characteristic dimension of up to 3 m and typical kinetic energy of up to 34 kJ	BVLOS	Sparsely populated area	If no AO, up to 1 km	150 m (operational volume)	Uncontrolled, with low risk of encounter with manned aircraft	AMC2	
PDRA-G02	1.1 / January 2022	Maximum characteristic dimension of up to 3 m and typical kinetic energy of up to 34 kJ	BVLOS	Sparsely populated area	n/a (direct C2 link)	As established for the reserved or	Reserved or segregated for the UAS operation	AMC3	

PDRA#	Edition/date	UAS characteristics	BVLOS/VLOS	Overflowed area	Maximum range from remote pilot	Maximum height	Airspace	AMC# to Article 11	Notes
						segregated airspace			
PDRA-G03	1.0 / January 2022	Maximum characteristic dimension of up to 3 m and typical kinetic energy of up to 34 kJ	BVLOS	Sparsely populated areas	n/a (direct C2 link)	50 m from ground unless in reserved or segregated airspace	Controlled or uncontrolled airspace if height is below 50 m, otherwise reserved or segregated airspace	AMC6	

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

AMC1 Article 11 Rules for conducting an operational risk assessment

ED Decision 2025/018/R

SPECIFIC OPERATIONS RISK ASSESSMENT (SORA) (SOURCE: JARUS SORA V2.5)

Edition: September 2025

Section 0 Executive summary

S0.1 The SORA approach

The SORA process is intended to provide a risk-proportionate method for determining the evidence and assurance required for an unmanned aircraft system (UAS) to be acceptably safe when operating in the 'specific' category of UAS operations as defined in Article 3(b) of Implementing Regulation (EU) 2019/947.

The SORA process provides structure and guidance for both the competent authority and the applicant to support an application to operate a UAS in a given operational environment. The benefit of this process is that both the competent authority and the applicant can allocate their available resources and time proportionally to the risk of the intended UAS operation. After receiving an operational authorisation, the applicant becomes the UAS operator. For the sake of simplicity, the term 'UAS operator' is used throughout the rest of this AMC.

The SORA is a holistic safety risk management process used to evaluate the risks related to a given UAS operation and then establish proportionate requirements a UAS operation should comply with to ensure that a target level of safety (TLOS) is met. This TLOS is defined for people and aircraft that are not involved in the UAS operation and is commensurate with the existing level of safety for manned aviation. The TLOS-related values were chosen to ensure that the risk posed by UAS operations to third parties will not be greater than that posed by manned aviation, which are seen as socially acceptable values (see Section 5(f) of the Scoping Paper to AMC RPAS 1309 Issue 2¹ and Section 1.2.1 of Annex F² Edition 2.5):

- i. for ground risk — fewer than one fatality per million hours (10^{-6} fatalities per flight hour) (for more details, see Annex F Edition 2.5² Section 1.2.1);
- ii. for air risk — fewer than one mid-air collision per 10 million flight hours (10^{-7} mid-air collisions per flight hour) for operations that are primarily conducted under self-separation and see-and-avoid (primarily in uncontrolled airspace); for operations that are conducted with separation provided by an air navigation service provider (primarily in controlled airspace), the TLOS is one mid-air collision per billion flight hours (10^{-9} mid-air collisions per flight hour).

The SORA has been developed using assumptions expected to be both credible and conservative across a wide range of UAS operations.

Under the 'specific' category, different UAS operations will have different levels of inherent risk and, thus, varying levels of the ability to maintain control of the operation to meet the TLOS will need to be demonstrated. To do this, the SORA has developed the specific assurance and integrity levels (SAIL), which map the maximum allowable loss-of-control rate to operational, organisational, personnel, design and production risk controls that, when implemented correctly at the required level, ensures that an operation meets the TLOS. This means that for a UAS operation conducted in a high-risk

¹ [jar_04_doc_amc_rpas_1309_issue_2_2.pdf \(jarus-rpas.org\)](#)

² http://jarus-rpas.org/wp-content/uploads/2024/06/SORA-v2.5-Annex-F-Release.JAR_doc_29pdf.pdf

environment (e.g. over a large city near an airport) more evidence would need to be provided to the competent authority demonstrating that the operation is safe than for the same UAS operated in a low-risk environment (e.g. at a protected test range and below 30 m).

S0.2 The SORA methodology

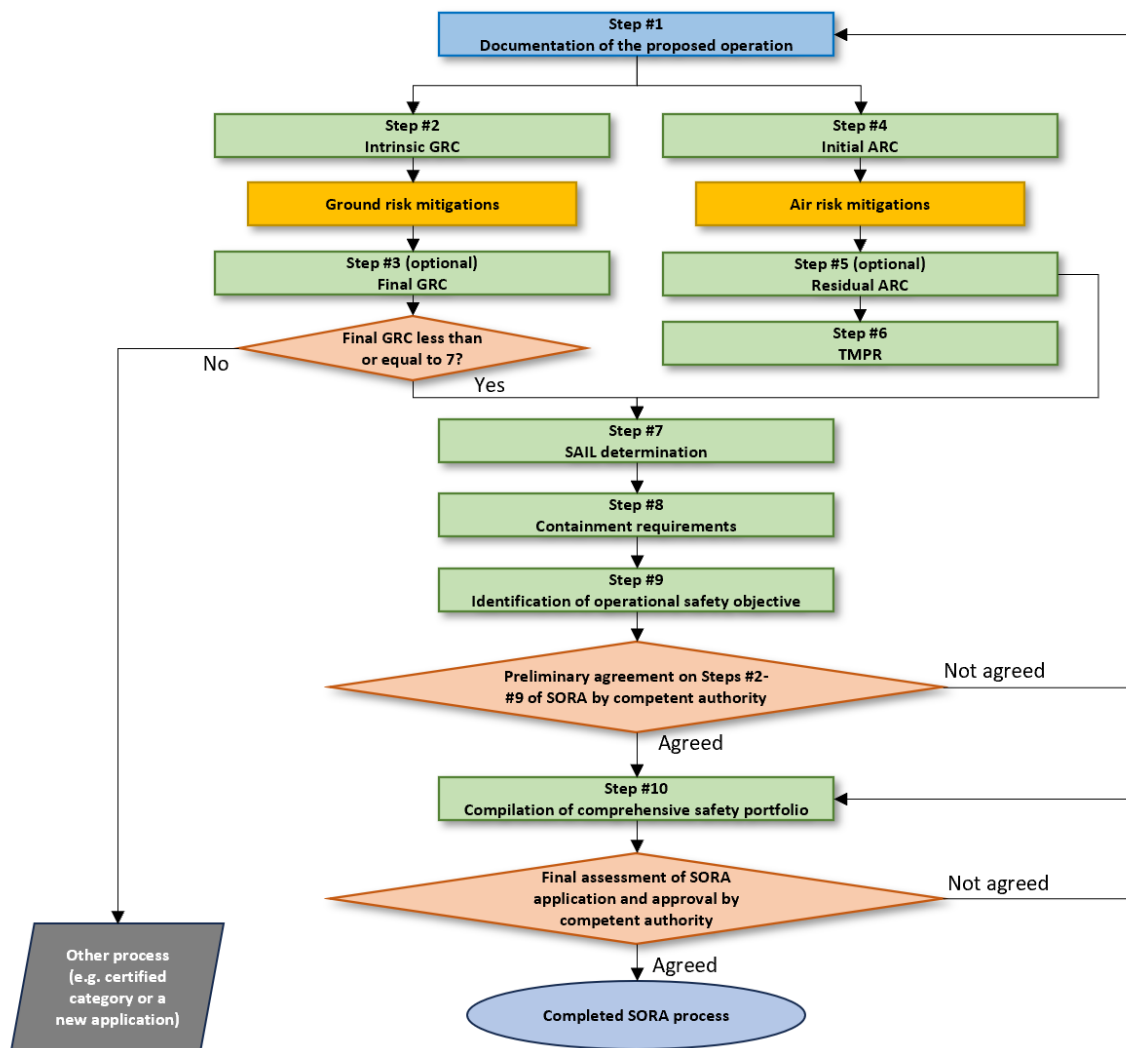


Figure 1 — The SORA process

Note: If UAS operations are conducted across different environments, some steps may need to be repeated for each particular environment (e.g. the operation includes a flight path partially in controlled and partially in uncontrolled airspace; in this case, steps #4 and #5 should be repeated for the two environments).

The SORA methodology consists of ten systematic steps:

Step #1: Documentation of the proposed operation

This is a preparatory step which is intended to ensure the UAS operator has sufficient information to complete Steps #2 to #9 of the SORA process. This information should enable the subsequent steps of the SORA process to be completed successfully.

Step #2: Determination of the intrinsic ground risk class (iGRC)

The iGRC (scaled from 1 to 10) is determined by the UA characteristics (maximum characteristic dimension and maximum speed) as well as the population density at risk in the operational volume and ground risk buffer.

Step #3: Determination of the final ground risk class (GRC) (optional)

The final GRC is determined based on any mitigations put in place, as described in [Annex B](#) to this AMC, which may have a significant effect on the likelihood of a fatality after the loss of control of the operation, including:

- (i) strategic mitigations intended to reduce the risk before the flight;
- (ii) tactical mitigations intended to reduce the risk during the flight;
- (iii) mitigations intended to reduce the effect of a ground impact.

A final GRC higher than 7 is outside the scope of the SORA and should be handled in the 'certified' category of UAS operations, as defined in Article 6 of Implementing Regulation (EU) 2019/947.

Step #4: Determination of the initial air risk class (iARC)

The determination of the ARC is done in Steps #4 and #5. In Step #4, the iARC is assessed based on an expected generalised encounter rate in the airspace identified in Step #1. The parameters that define the four categories of ARC (a, b, c, d) are the following: whether the airspace is atypical (e.g. segregated), altitude, controlled by air traffic versus uncontrolled, airport versus non-airport environment, and airspace over urban versus rural environments.

Step #5: Application of strategic mitigations to determine the residual air risk class (ARC)

The residual ARC is obtained after applying any relevant strategic mitigations in order to lower the iARC. Two types of strategic mitigations, as described in [Annex C](#), exist in the SORA. Air risk mitigations are either operational restrictions (e.g. boundaries, time of operation) which are controlled by the UAS operators, or by the structure and associated rules of the airspace which is controlled by the relevant authorities (e.g. U-space airspace).

Step #6: Tactical mitigation performance requirements (TMPRs) and robustness levels

Tactical mitigations for the operation are then applied in Step #6 to mitigate any remaining unacceptable residual risk of a mid-air collision with manned air traffic after the strategic mitigations have been applied.

TMPRs address the functions of detect, decide, command, execute and feedback loop (see [Annex D](#) to this AMC) for each residual ARC.

Step #7: Determination of the SAIL

A SAIL (scaled from I to VI) is then assigned to the operation described in Step #1 based on the final GRC and residual ARC.

Step #8: Determination of containment requirements

The containment requirements aim to ensure that the TLOS can be met for both ground and air risk in the adjacent ground area.

There are three possible levels of robustness for containment: low, medium and high; each level with a set of safety requirements described in [Annex E](#) to this AMC as a function of the UA characteristics, SAIL, average population density in the defined adjacent ground area and the presence of an outdoor assembly of people within 1 km of the outer limit of the operational volume.

Step #9: Identification of operational safety objectives (OSOs)

The SAILs define the level of integrity and assurance (low, medium, high) to be met for each OSO according to the criteria provided in [Annex E](#) to this AMC.

For the assigned SAIL, the UAS operator is required to show compliance with each of the 17 OSOs, at the defined robustness level (for lower SAILs, it may not be required to show compliance for some OSOs to the competent authority). The OSOs cover but are not limited to: the UAS designer, UAS operator or other organisations involved in maintenance, related services and training, UAS technical aspects, deterioration of external systems supporting UAS operations, human-machine interface, human error, adverse operating conditions.

Step #10: Comprehensive safety portfolio (CSP)

The CSP is a suite of documents showing compliance with the requirements resulting from the SORA steps for the proposed operation. If the CSP does not provide appropriate evidence as determined by the SORA process at a given SAIL, changes to the proposed operation (e.g. reduction of the intrinsic risk of the operation), additional mitigations, possible UAS design changes, or further analysis/evidence may be needed.

[Annex A](#) to this AMC provides guidance and templates on how to provide relevant information to the competent authority as part of the SORA process.

Section 1 Introduction**S.1.1 Preface**

The SORA methodology guides both the UAS operator and the competent authority towards the determination of whether a UAS operation can be conducted safely. The document should not be used as a checklist, nor be expected to provide answers to all the potential challenges related to the UAS operation. The SORA is a guide that allows an operator to identify the risk and, if needed, reduce it to an acceptable level by tailoring their mitigations to the intended UAS operation. This involves meeting or exceeding the target level of safety (TLOS) regardless of the complexity of the UAS operation, UA size, or area of operation. The TLOS of operations conducted under the 'specific' category covered by the SORA is equivalent to that of the 'open' and 'certified' categories. For this reason, it does not contain prescriptive requirements but rather safety objectives to be met at various levels of robustness commensurate with the risk of a given operation.

S.1.2 Purpose of the document

- (a) The purpose of the SORA is to propose a methodology of risk assessment to support an application for authorisation to operate a UAS in the 'specific' category.
- (b) Due to the operational differences and expected increase in level of risk of the operating environment, the 'specific' category cannot automatically take credit for the safety and performance data demonstrated with the large number of UAS operating in the 'open' category. Therefore, the SORA provides a consistent approach to assess the additional risks associated with the expanded operations not covered by the 'open' category.
- (c) This methodology is proposed as an acceptable means to evaluate the safety risks and determine the acceptability of a proposed UAS operation in the 'specific' category.
- (d) This methodology may be applied where the traditional approach to aircraft certification (approving the design, issuing an airworthiness approval and a type certificate) may not be appropriate and proportionate to the safety risk presented for the intended operation. This methodology may also support activities necessary to determine the associated airworthiness requirements.

- (e) The methodology is based on the principle of a holistic safety risk-based assessment model used to evaluate the risks of a given operation. The model considers the most common safety threats associated with a specified hazard, the relevant design, and the proposed operational mitigations for a specific UAS operation. The SORA then helps to evaluate the risks systematically and determine any operational limitation required for its safe operation. This method allows the UAS operator to determine acceptable risk levels and validate that those levels are complied with by the proposed operations. The competent authority may also apply this methodology to gain confidence that the UAS operator can conduct the operation safely.
- (f) The methodology, the related processes, and the values proposed in this document are intended to guide a UAS operator when performing a risk assessment of an intended operation to obtain an operational authorisation by the competent authority. At the same time, this material is intended to support the competent authority when assessing the completeness and acceptability of an application for a UAS to be operated in the 'specific' category.

S.1.3 Applicability

- (a) The methodology presented in this document is aimed at evaluating the safety risks involved in the operation of one or multiple UAS¹ of any class and size. In the case of multiple simultaneous UA operating relative to each other, such as displays for entertainment, it is recommended to examine common mode failures and adapt the application of the SORA as needed in consultation with the competent authority.
- (b) Safety risks associated with collisions between UA and manned aircraft are in the scope of the methodology. The risk of collision between two UA will be addressed in future revisions of the document. It is expected that multiple simultaneous UAS operations and concurrent high-volume operators have a deconfliction strategy for their own UA.
- (c) The carriage of people is outside the scope of the SORA. The carriage of dangerous goods (e.g. weapons, munitions of war, explosives, hazardous medical samples) on board the UAS that present additional hazards is excluded from the scope of this methodology and might require additional safety considerations (e.g. demonstration of the ability to contain the dangerous goods). For more information, please refer to [GM1 Article 2\(11\)](#).
- (d) Privacy, data protection, liability, insurance, security and environmental protection are excluded from the scope of applicability of this methodology.
- (e) In addition to performing the SORA process, the UAS operator should also ensure compliance with all other regulatory frameworks applicable to UAS operations that are not necessarily addressed by the SORA, i.e. the SORA does not preclude any additional regulatory requirements implemented by the competent authority.
- (f) The SORA can be used to obtain operational authorisation for UAS operations conducted in multiple locations. In that situation, the UAS operator needs to provide a SORA that is applicable to all these areas to show that the SORA requirements will be met for all flights performed under the operational authorisation obtained. If a UAS operator can demonstrate to have sufficient procedures in place to correctly allocate operational volumes, buffers, adjacent ground areas and airspace volumes, a generic location authorisation could be considered as described in [GM2 UAS.SPEC.030\(2\)](#).

S.1.4 SORA documents

The SORA consists of the following parts:

¹ Refer to definition I.94 'Multiple simultaneous UAS operations'.

- (a) Main Body ([AMC1 to Article 11](#)): describing the SORA risk assessment process;
- (b) [Annex A to AMC1 to Article 11](#): guidelines for the UAS operator on collecting and presenting system and operation information for a specific UAS operation to the competent authority;
- (c) [Annex B to AMC1 to Article 11](#): integrity and assurance levels for the mitigations used to reduce the intrinsic ground risk class (iGRC);
- (d) [Annex C to AMC1 to Article 11](#): air risk strategic mitigations;
- (e) [Annex D to AMC1 to Article 11](#): air risk tactical mitigations;
- (f) [Annex E to AMC1 to Article 11](#): integrity and assurance levels for the operational safety objectives (OSOs);
- (g) Annex F Edition 2.5¹: theoretical basis for ground risk classification and containment requirements;
- (h) [Annex I to AMC1 to Article 11](#): glossary.

Section 2 Key concepts and definitions

S.2.1 'Risk' in the context of the SORA

- (a) The definition of 'risk' used in the SORA is the combination of the frequency (probability) of an occurrence and its associated level of severity.
- (b) The consequence of an occurrence will be designated as a harm of some type.
- (c) Many different categories of harm can arise from any given occurrence. This document will focus on occurrences of harm (e.g. UAS crash) that are short-lived and usually give rise to the potential loss of life. Chronic events (e.g. toxic emissions over a period of time) are explicitly excluded from this assessment. The categories of harm in this document involve the potential for:
 - (i) fatal injuries to third parties on the ground²;
 - (ii) fatal injuries to third parties in the air.
- (d) As the SORA only addresses safety risks, it is acknowledged that the competent authorities, when appropriate, may consider additional categories of harm (e.g. cybersecurity, privacy, disruption of a community, environmental damage, financial loss, etc.) as defined in point 2(c) of Article 12 of Implementing Regulation (EU) 2019/947.
- (e) Fatal injury is a well-defined condition and known by competent authorities. Therefore, the risk of under-reporting fatalities is almost non-existent. The quantification of the associated risk of fatality is straightforward. The usual means to measure fatalities are by the number of deaths within a particular operating time interval (e.g. fatal accident rate per million flight hours) or the number of deaths for a specified circumstance (e.g. fatal accident rate per number of take-offs).
- (f) Damage to critical infrastructure is a more complex condition and different countries may have differing sensitivities to this harm. Therefore, the quantification of the associated risks may be difficult and subject to national specificities, thus it is not addressed within the SORA and should

¹ http://jarus-rpas.org/wp-content/uploads/2024/06/SORA-v2.5-Annex-F-Release.JAR_doc_29pdf.pdf

² The risks to involved persons should be mitigated appropriately (e.g. through appropriate procedures). Involved persons should accept the risk of the UAS operation by informed consent and by explicitly agreeing to participate. For additional information, please refer to GM1 Article 2(18).

be subject to a separate risk assessment. This should be done in cooperation with organisations responsible for the infrastructure, as they are most knowledgeable of the threats.

S.2.2 The SORA semantic model

- (a) The semantic model is a key aspect to understanding the SORA and introduces concepts and common terms for all users of the SORA.
- (b) To facilitate effective communication of all aspects of the SORA, the methodology requires standardised use of terminology for phases of operation¹, procedures and operational volumes. The semantic model shown in Figure 2 provides a consistent use of terms for all SORA users. Figure 3 provides a graphical representation of the model and a visual reference to further aid the reader in understanding the SORA terminology.

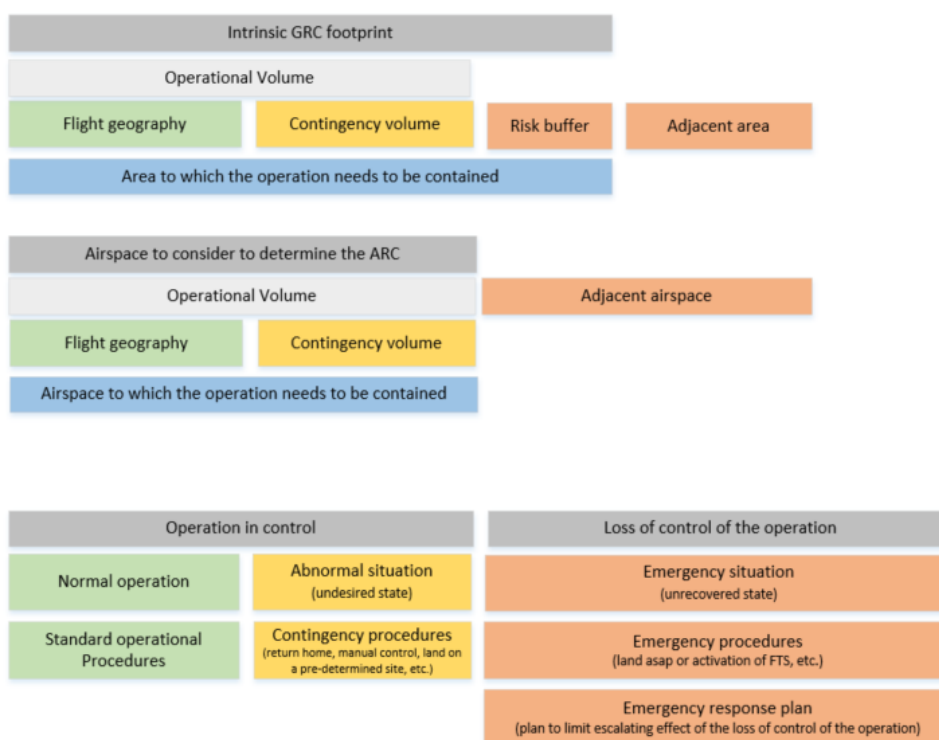


Figure 1 — The SORA semantic model

¹ An operation may be a single flight or multiple sequential and/or simultaneous flights that are assessed under a single SORA process.

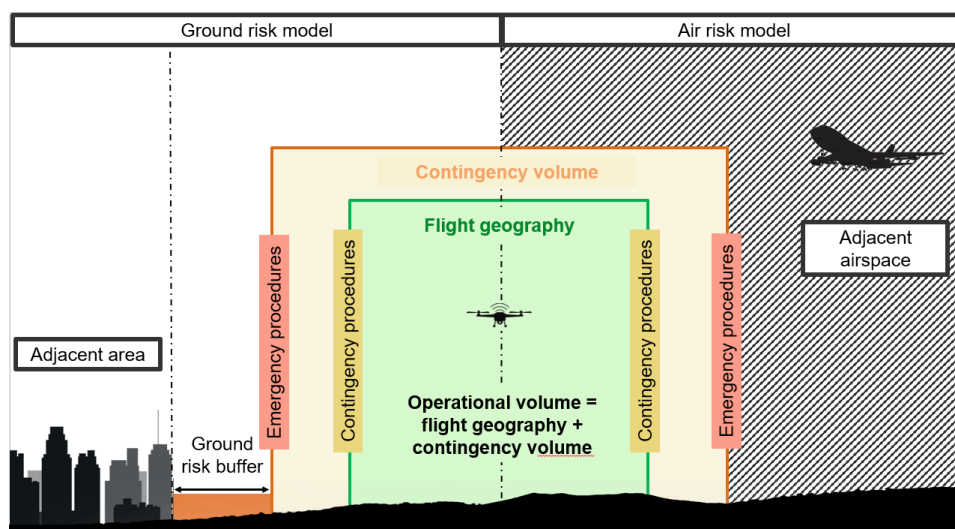


Figure 2 — Graphical representation of the SORA semantic model

- (c) The SORA considers two states of the operation: ‘in control’ and ‘loss of control’. The SAIL score of the operation is inversely proportional to the acceptable loss-of-control rate of the operation to meet the OSOs. The higher the SAIL score, the higher the level of integrity and assurance of the OSOs becomes, which should result in a decreased loss-of-control rate for the operation.

S.2.2.1 The operational volume

- (a) Operational volume is defined as the volume in which the operation is intended to take place safely.
- (b) It is made up of the flight geography and the contingency volume.
- (c) The operational volume is the basis to determine the air risk class (ARC) of an operation.
- (d) The main SORA process is applied to the operational volume and ground risk buffer. To protect the adjacent ground area and airspace, the UAS operation should be contained within the operational volume.

S.2.2.2 The flight geography

- (a) The flight geography is the volume where the UAS operates in normal operations.
- (b) Depending on the type of the operation, the flight geography can be defined as a flight corridor for each planned trajectory, a larger volume to allow for a multitude of similar flights with changing flight paths or a set of different flight volumes fulfilling some specific conditions.
- (c) Whenever a particular flight requires the UA to traverse or loiter/hold at a specific point of interest, this point shall be included inside the flight geography. Refer to Chapter A.5 of [Annex A](#) to this AMC for additional information.

S.2.2.3 The contingency volume

- (a) The contingency volume surrounds the flight geography. The outer limit of the contingency volume is equivalent to the outer limit of the operational volume.
- (b) Entry into this volume is always considered an abnormal situation and requires the execution of appropriate contingency procedures to return the UA to the flight geography or perform a safe contingency landing. The size of the contingency volume should be determined based on the appropriate contingency procedures.

- (c) The outer limit of the contingency volume should include sufficient margins for system and operational errors (refer to the definition of 'total system error' in I.139 of [Annex I](#) to this AMC).
- (d) It should be noted that an abnormal situation may also occur inside the flight geography.

S.2.2.4 The ground risk buffer

- (a) The ground risk buffer is an area on the ground that surrounds the footprint of the contingency volume.
- (b) If the UA exits the contingency volume during a loss of control of the operation, it is expected to end its flight without exceeding the ground risk buffer.
- (c) The appropriate size of the ground risk buffer is based on the individual risk of an operation and is driven by the flight characteristics of the UA and the identified containment requirements of the SORA.
- (d) The footprint of the operational volume plus the ground risk buffer is the area used to determine the ground risk class (GRC).

S.2.2.5 The adjacent ground area

- (a) The adjacent ground area represents the ground area adjacent to the ground risk buffer where it is reasonably expected that a UA may crash following a loss-of-control situation resulting in a fly-away.
- (b) The lateral inner limit of the adjacent ground area is the outer limit of the ground risk buffer. The lateral outer limit of the adjacent ground area is computed starting from the outer limit of the contingency volume (see Figure 7).
- (c) The size of the adjacent ground area depends on the UA performance. UAS operators should not design operational volume areas which are not intended for use but are only there for manipulation of the composition of the adjacent ground area.

S.2.2.6 The adjacent airspace

- (a) The adjacent airspace corresponds to the airspace where it is reasonably expected that a UA may fly following a loss-of-control situation resulting in a fly-away.
- (b) The adjacent airspace is the airspace adjacent to the operational volume.
- (c) The lateral outer limit of the adjacent airspace is defined by the lateral outer limit of the adjacent ground area as described in point S.4.8.3(b).

S.2.3 States of the operation

S.2.3.1 Operation in control

- (a) An operation is considered in control when the remote crew can manage the current flight situation, such that no persons on the ground or in the air onboard manned aircraft are put in immediate danger.
- (b) This holds true for both normal and abnormal situations; however, the safety margins in the abnormal situation are reduced. In the abnormal state, it is the remote crew's duty to try to return the operation back to normal state by executing contingency procedures as soon as practically possible.
- (c) Normal operation

The UAS operator utilises standard operational procedures consisting of a set of instructions covering policies, procedures and responsibilities set out by the UAS operator that support operational personnel in ground and flight UAS operations safely and consistently.

(d) **Abnormal situation**

- (i) An abnormal situation is an undesired state where it is no longer possible to continue the flight using standard operational procedures, but the safety of the aircraft and of the persons on the ground or in the air is not in immediate danger. In this case, contingency procedures should be applied. Abnormal situations require attention and corrective actions (e.g. reduced engine performance, a system failure that can be managed with the backup or redundant system, issues that do not require an immediate descent, tolerable minor flight control malfunction or navigation equipment malfunction described handled by the UAS flight manual). Abnormal situations should not be confused with emergency situations.
- (ii) Contingency procedures are designed to prevent a significant event (e.g. loss of control of the operation) that has an increased likelihood to occur in the future due to the current abnormal state of the operation. These procedures should return the operation to normal state and allow the return to using standard operational procedures or allow the safe cessation of the flight.

S.2.3.2 Loss of control of the operation

- (a) The loss of control of the operation is a state that corresponds to situations:
 - (i) whose outcome highly relies on providence; or
 - (ii) which cannot be handled by a contingency procedure.
- (b) In the context of the semantic model, this includes situations where a UA exits the operational volume and potentially operates over or in an area that may be characterised by a different level of ground or air risk.
- (c) The loss-of-control state is also entered if a UA does not follow the predefined route and the remote pilot is unable to control it and it crashes, or if an unplanned flight termination sequence is executed, even if this happens inside the operational volume.
- (d) Emergency procedures are executed in case of a loss of control of the operation. They are executed by the remote crew and may be supported by automated features of the UAS (or vice versa) and are intended to mitigate the effect of failures that cause or lead to an emergency condition (e.g. flight termination system). Emergency procedures should be activated as soon as the UA reaches the boundaries of the operational volume. However, as soon as the remote crew identifies a failure condition where the control of the UA cannot be recovered through contingency procedures (e.g. loss of propulsion), the remote crew may initiate the emergency procedures when the UAS is in the operation volume. Emergency procedures deal with affecting the UA to either:
 - (i) return to a state where the operation is 'in control'; or
 - (ii) minimise hazards until the flight has ended.
- (e) **Emergency response plan (ERP)**
 - (i) The ERP deals with the potential hazardous secondary or escalating effects after a loss of control of the operation (e.g. timely intervention of emergency services).

- (ii) The ERP is different from the emergency procedures, as it does not deal with the control of the UA.
- (iii) The ERP is used for coordinating all the activities needed to respond to incidents and accidents.
- (f) Containment is a function that consists of technical and operational mitigations that are meant to contain the flight of the UA within the defined operational volume and ground risk buffer and reduce the likelihood of a loss of control of the operation resulting in a fly-away.

S.2.4 Robustness

- (a) To properly understand the SORA process, it is important to introduce the key concept of robustness.
- (b) Robustness is the term used to describe the combination of two key characteristics of a risk mitigation or operational safety objective: the level of integrity (i.e. how good the mitigation/objective is at reducing the risk), and the level of assurance (i.e. the degree of certainty with which the level of integrity is ensured).
- (c) The activities used to substantiate the level of integrity and assurance are detailed in Annexes [B](#), [C](#), [D](#) and [E](#) to this AMC. These annexes provide either guidance material or reference industry standards and practices where applicable.
- (d) Table 1 provides guidance to determine the level of robustness based on the level of integrity and the level of assurance.

	Low assurance	Medium assurance	High assurance
Low integrity	Low robustness	Low robustness	Low robustness
Medium integrity	Low robustness	Medium robustness	Medium robustness
High integrity	Low robustness	Medium robustness	High robustness

Table 1 — Robustness, integrity and assurance matrix

- (e) For example, if an applicant demonstrates a medium level of integrity with a low level of assurance, the overall robustness will be considered low as the robustness is equal to the lowest level of either integrity or assurance.
- (f) Any given risk mitigation or operational safety objective will have different requirements for the different levels of robustness. The SORA has three levels of robustness commensurate with the risk: low, medium and high.
- (g) Guidance for the level of assurance is provided below. An applicant is required in all cases to achieve the required level of integrity and produce or obtain any necessary evidence required.
 - (i) For **low-level assurance**, the applicant declares that the required level of integrity has been achieved. The competent authority may request relevant evidence for review (e.g. during oversight).
 - (ii) For **medium-level assurance**, the applicant declares that the required level of integrity has been achieved. The declaration should include a reference to the evidence and the evidence should be provided to the competent authority, unless the applicant uses a means of compliance¹ published by EASA. In this case, the applicant may not be required to submit evidence during the application process. However, the competent authority may request relevant evidence for review (e.g. during oversight).

¹ For example, an acceptable means of compliance (AMC).

- (iii) For **high-level assurance**, the achievement of the required level of integrity is verified¹ to be acceptable by the competent authority or by an entity that is designated² by the competent authority.
- (h) The specific criteria defined in the SORA annexes take precedence over the criteria defined in point (g).
- (i) To accommodate national specificities, competent authorities may require different activities to substantiate the level of robustness. National specificities could include nationally sensitive infrastructure, protection of environmental areas, etc., and they are published by MSs as geographical zones according to Article 15 of Implementing Regulation (EU) 2019/947.

S.2.5 Roles and responsibilities

While performing an assessment using the SORA process, several key actors might be required to interact in different phases of the process. The key actors to whom SORA is applicable are described in this section.

- (a) **Applicant** — The applicant is the party that produces evidence for compliance with the operational safety objectives or mitigations. It may be the future UAS operator that seeks to obtain an operational authorisation or the organisation that designs or produces the UAS or a training organisation. Supporting material for the assessment may be provided by third parties (e.g. the designer of the UAS or the equipment, U-space service providers, etc.).
- (b) **UAS operator** — The UAS operator is an applicant that has obtained an operational authorisation from the competent authority. The operational authorisation allows the UAS operator to perform a series of flights provided they are performed in accordance with the scope and limitations of the operational authorisation, based on at least the SORA compliance demonstration. The UAS operator is responsible for the safe operation of the UAS. Therefore, the compliant execution of the procedures, training and other applicable programmes as well as the observation of the limitations and other requirements of the applicable concept of operations are the UAS operator's obligation.
- (c) **UAS designer and UAS production organisation** — The UAS designer and the UAS production organisation is the party that designs and produces the UAS. In some cases, a UAS may be equipped with one or more components (e.g. parachute) designed and produced by an entity other than the UAS designer and installed by a UAS component integrator (that may also be the same entity designing the component or a different entity or the UAS operator itself). It may be expected that sometimes the design and production of the UAS or of the components is carried out by two different organisations. The design and production organisation has unique design evidence (e.g. system performance, system architecture, software/hardware development documentation, test/analysis documentation, etc.) it may choose to share with one or more UAS operators or with the competent authority or with EASA to help substantiate the operator's SORA safety case. Alternatively, a design and production organisation may use the SORA process to target design objectives for specific or generic operations, tailored to the relevant SAIL. To obtain airworthiness approval(s), these design objectives could be complemented by the use of Light UAS certification specifications (CSs)³ or industry consensus standards if they are found

¹ Refer to definition I.154 'Verified' of Annex I to AMC1 to Article 11.

² An entity designated by the competent authority should be understood in the meaning of a qualified entity as described in Article 69 of Regulation (EU) 2018/1139. The competent authority may grant to the designated entity the privilege to issue a certificate or an operational authorisation.

³ For light UAS, please refer to Special Condition Light UAS at [Special Condition Light UAS | EASA](#).

acceptable by EASA. The UAS designer or the UAS production organisation may also be a UAS operator (for example, during a test flight campaign).

- (d) **Competent authority** — The competent authority that is referred to throughout this AMC is the authority designated by the Member State in accordance with Article 17 of Implementing Regulation (EU) 2019/947 to assess the safety case of UAS operations and to issue the operational authorisation in accordance with Article 12 of that Regulation. The competent authority may accept a UAS operator's submission of an operations manual with an associated SORA-based risk assessment. Through the SORA process, the UAS operator may need to consult with the competent authority to ensure consistent application or interpretation of individual steps. The competent authority should also oversee the UAS operator in accordance with point (h) of Article 18 of Implementing Regulation (EU) 2019/947. When required, the competent authority may decide to make use of 'recognised entities' for reviewing supporting evidence for mitigations and operational safety objectives of an application. In this case, the competent authority defines the process and the conditions on how to appoint the 'recognised entity' and the competent authority has responsibility when issuing an operational authorisation based on the recommendation provided by the 'recognised entity'. Alternatively, a competent authority may use a 'designated entity', also referred to as 'qualified entity', in accordance with Article 69 of Regulation (EU) 2018/1139. In this case, the 'designated entity' may be granted the privilege to issue the operational authorisation.

According to Article 77(1) of Regulation (EU) 2018/1139, EASA is the competent authority in the European Union to verify compliance of the UAS design and its components with the applicable rules, while the authority that is designated by the Member State is the competent authority to verify compliance with the operational requirements and compliance of the personnel's competency with those rules. The following elements are related to UAS design:

- the OSOs marked in Table 14 as those for which the UAS designer is expected to develop evidence;
- M2 mitigation: criterion #1;
- TMPR (design aspects);
- verification of the system to contain the UAS to avoid infringement of the adjacent areas on the ground and/or adjacent airspace in accordance with Step #8 of the SORA process.

If the UAS operation is classified as SAIL V and VI, compliance with the design requirements defined by the SORA (i.e. design-related OSOs, mitigations linked with the design and containment function) should be demonstrated through a type certificate (TC) issued by EASA according to Annex I (Part 21) to Regulation (EU) No 748/2012¹, as defined in Article 40(1)(d) of Implementing Regulation (EU) 2019/945². For the OSOs and mitigations, the competent authority may verify their compliance.

If the UAS operation is classified as SAIL IV, compliance with the design-related SORA requirements (i.e. design-related OSOs, mitigations linked with the design and containment function) should be demonstrated through a design verification report (DVR)³ issued by EASA.

¹ Commission Regulation (EU) No 748/2012 of 3 August 2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations (<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32012R0748&qid=1753894524265>).

² Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems (OJ L 152, 11.6.2019, p. 1) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32019R0945>).

³ [Design verification report | EASA](#)

Evidence of compliance with non-design-related OSOs and mitigations will be provided to the competent authority according to the level of robustness of the OSOs, which will assess them as part of the application for the operational authorisation.

If the UAS operation is classified as SAIL I, II or III, the competent authority may accept, as part of the operational authorisation process, a statement of compliance provided by the designer of the UAS or of a component with all OSOs and mitigations related to design.

Regardless of the SAIL defined at the end of the SORA process, when the claimed level of robustness of the mitigation M2 or of the containment is high, the competent authority should require the UAS operator to use a UAS with a DVR issued by EASA limited to compliance with mitigation M2 and/or the containment requirements¹.

- (e) **Air navigation service provider (ANSP)** — The ANSP is the designated provider of air traffic service in a specific area of operation (airspace). The ANSP assesses and/or should be consulted by the UAS operator whether the proposed operation can be safely conducted in the particular airspace the ANSP covers. Whether an ANSP approval would be required may depend on whether the particular proposed operation may be considered as being compliant with the rules of the air (thus being integrated in the airspace), national rules, or should be managed as a contained hazard (for example, through segregation according to the airspace policy of the Member State of operation)².
- (f) **U-space service provider (USSP)** — USSPs are entities certified according to Implementing Regulation (EU) 2021/664³ that provide services to support the efficient use of airspace as well as the safety of UAS operations. These services may support an operator's compliance with their safety obligation and risk analysis.
- (g) **Remote pilot-in-command (RPIC)** — The remote pilot that is designated by the UAS operator as being in command of and charged with the safe conduct of the flight. Some UAS operations may require employing more than one remote pilot with different tasks; however, in this case, only one pilot is responsible as RPIC.

UAS designed with a high level of automation may reduce the remote pilot's workload to the point that operations can be conducted without allowing the intervention of a remote pilot.
- (h) **Remote crew** — The remote crew includes all UAS operator personnel involved in the operation of the UAS, with duties essential to the safe operation of the UAS. The RPIC is part of the remote crew.
- (i) **Maintenance staff** — Ground personnel in charge of maintaining the UAS before and after the flight in accordance with the UAS maintenance instructions.

¹ If the UAS has a DVR that covers the full design, this may cover also the mitigations.

² The role of the ANSP as a function is distinct from that of the aviation regulator or the function of safety oversight.

³ Commission Implementing Regulation (EU) 2021/664 of 22 April 2021 on a regulatory framework for the U-space (OJ L 139, 23.4.2021, p. 161) (http://data.europa.eu/eli/reg_impl/2021/664/oj).

Section 3 The SORA walk-through

This section provides a description for UAS operators of whether the SORA process applies to their operations and how to complete the required SORA steps.

S.3.1 Introduction to the SORA walk-through

- (a) This section relates to how the SORA process is described in the document. The intent is to provide both the UAS operators and the competent authorities with clear guidance in terms of what is expected from the SORA process.
- (b) The following headers are applied:
 - (i) **Outcome:** is the result achieved when the task has been completed. All outcomes are summarised in the comprehensive safety portfolio (CSP).
 - (ii) **Task description:** is a recommendation to be followed by UAS operators when completing the SORA process.
 - (iii) **Instructions:** is material provided to UAS operators to better identify and understand the steps contained in the task description.

S.3.2 Before starting the SORA process

S.3.2.1 Outcome

UAS operators will determine whether they should carry out the SORA process.

S.3.2.2 Task description

- (a) Before starting the SORA process, the following should be verified:
 - (i) whether the UAS operator uses a tethered aircraft for which Implementing Regulation (EU) 2019/947 does not apply¹;
 - (ii) whether the intended UAS operation falls under the 'open' category;
 - (iii) whether the intended UAS operation is covered by a standard scenario (STS) as defined by Appendix 1 to Implementing Regulation (EU) 2019/947 and the UAS bears an appropriate class identification label;
 - (iv) whether the UAS operation is covered by one of the PDRAs published by EASA as AMC to Article 11 to Implementing Regulation (EU) 2019/947;
 - (v) whether the operation involves the transport of people or the transport of dangerous goods posing a high risk to third parties²; in these cases, the operation falls under the 'certified' category;

¹ According to Annex I to Regulation (EU) 2018/1139, Implementing Regulation (EU) 2019/947 does not apply when the UAS operator uses a tethered aircraft with

- (a) no propulsion system, where the maximum length of the tether is 50 m, and where
 - (i) the MTOM of the aircraft, including its payload, is less than 25 kg, or
 - (ii) in the case of a lighter-than-air aircraft, the maximum design volume of the aircraft is less than 40 m³;
- (b) an MTOM of not more than 1 kg.

In this case, national regulations apply.

² Refer to GM1 Article 6 for additional information.

- (vi) whether the operation is subject to any local no-go criteria established by the competent authority (e.g. local conditions published by the competent authority of the State of operation).
- (b) If none of the above applies, the SORA process should be applied.

S.3.3 The phases of the SORA process

- (a) As part of the SORA process, it is critical to review the steps and validate the assumptions and derivations made throughout this process. The SORA process can be split into two phases (see Figure 4):
 - (i) Phase 1 (Step #1 to Step #9) focuses on the derivation of safety requirements and proposed means of compliance; and
 - (ii) Phase 2 (Step #10) focuses on compliance with the derived safety requirements from Phase 1.
- (b) Upon completing Phase 1, it is advisable for the UAS operator to obtain confirmation from the competent authority regarding the correctness of the process conducted thus far. The phases ensure there is a review of the first-phase outputs for the UAS operator to determine whether any adjustments to the proposed operation are required before undertaking the second phase. This approach should minimise unnecessary iterations in the operational procedures, remote crew requirements, and system(s) design in the proposed operations and mitigations¹.
- (c) An additional benefit of the two phases is that they provide an opportunity for the UAS operator to engage with the competent authority. This is intended to support reaching a preliminary agreement that Phase 1 has been undertaken correctly, and that the derived requirements and proposed means of compliance for Phase 2 are appropriate.

¹ EASA created an automated platform in the IAM HUB to support UAS operators in conducting the SORA Phase 1. The platform may be reached at <https://www.easa.europa.eu/en/domains/civil-drones>.

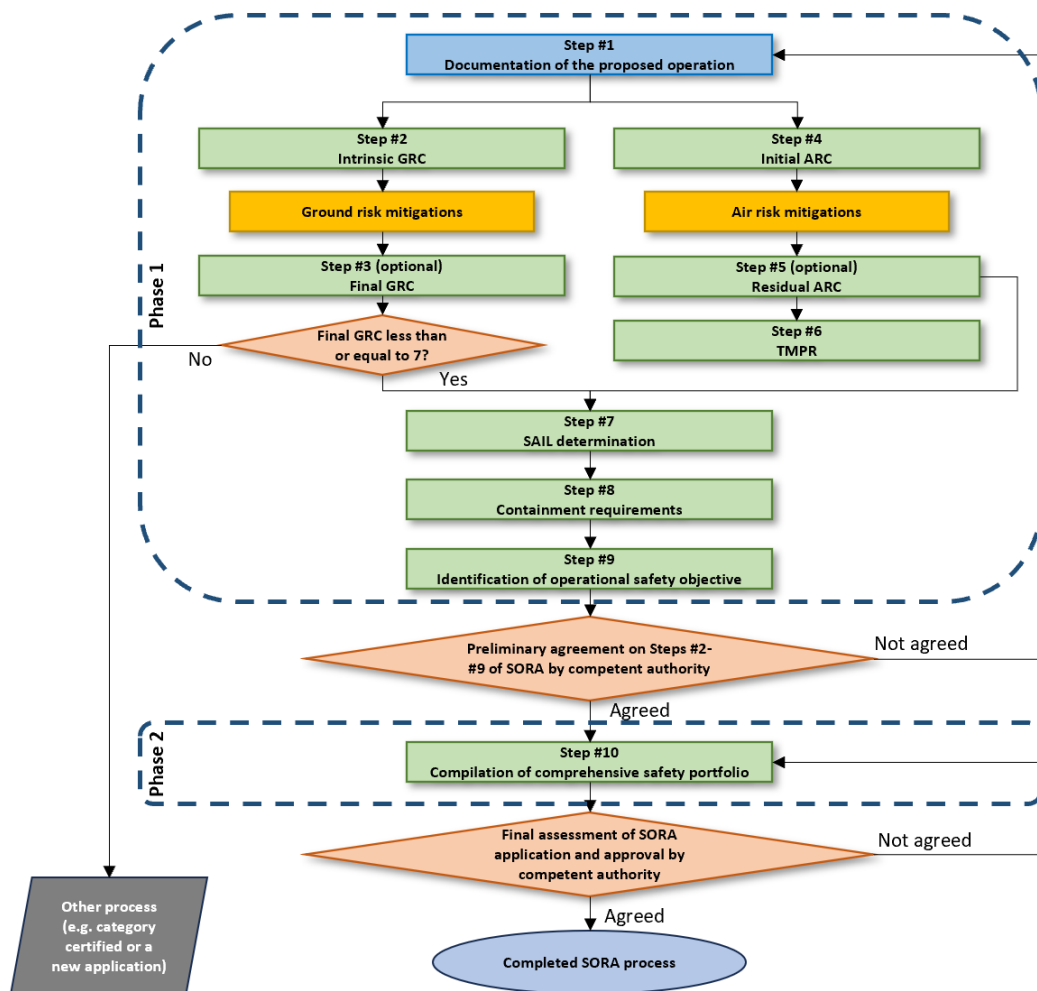


Figure 3 — The phases of the SORA process

S.3.3.1 Phase 1 (Derivation of requirements)

- The purpose of Phase 1 is to derive all relevant safety requirements based on the proposed operation(s) which should result in a document suite that sufficiently describes the proposed operation(s). This should include the relevant information, safety claims and derived requirements of Step #1 to Step #9. The UAS operator should collect explanations, but not the entire justification, of the means by which the UAS operator will demonstrate compliance with any safety claims. This can assist both the UAS operator and the competent authority in ensuring that any means of compliance proposed is/are valid and will result in satisfying the safety claims. This may take the form of an initial compliance matrix (an example is provided in Chapter A.4 of [Annex A](#) to this AMC).
- The results of Phase 1 may be the basis for the competent authority to conduct a preliminary evaluation. The competent authority may or may not be able to provide its formal agreement until final compliance evidence (covered in Phase 2) is submitted and reviewed.
- It is recommended that the UAS operator contact the competent authority as early as possible in order to present the available information and reach a common initial understanding and in-principle agreement on the safety claims, in particular the final GRC, residual ARC, and SAIL.

S.3.3.2 Phase 2 (Compliance with requirements)

- (a) Phase 2 occurs after the completion of Step #9. This phase is a final set of iterations to complete the SORA process. This should result in a SORA comprehensive safety portfolio (CSP), which collects the work done in all previous steps of the SORA into a comprehensive, including evidence showing compliance with the SORA requirements.
- (b) If the SORA process is completed correctly, the CSP should provide all the necessary claims, arguments and evidence to support the assessment and approval of the proposed operation(s).

Section 4 The SORA process

S.4.1 Step #1 — Documentation of the proposed operation

S.4.1.1 Introduction

Step #1 provides an opportunity for the UAS operator to collect and present contextual information about the proposed operation and the intended safety claims made during Phase 1 of the SORA process.

S.4.1.2 Outcome

A sufficiently detailed operational concept that allows the UAS operator to continue through the SORA process.

S.4.1.3 Task description

- (a) Compilation of operational, technical and organisational information. Such information may include:
 - (i) maps, figures, diagrams and other information detailing the operational volume, the ground risk buffers, the adjacent ground area and the adjacent airspace to facilitate the determination of:
 - (A) the intrinsic GRC (i.e. population density maps, information on land use),
 - (B) the initial ARC (i.e. information on airspace use, aerodromes, and airspace charts), and
 - (C) the adjacent ground areas;
 - (ii) information about the operational, technical and organisational elements of:
 - (A) the intended operation and functions during flight, including intended flight profiles, states and modes that provide for safety throughout the nominal, contingency and emergency phases of flight,
 - (B) any ground and air risk mitigations (strategic and tactical) used to reduce the intrinsic ground risk or the initial air risk.
- (b) A description of the contingency volume and ground risk buffers, and how they were determined.
- (c) The UAS operator may use Chapter A.3 of [Annex A](#) to this AMC to gain an understanding of the type of data that needs to be presented, and any other information that supports the risk assessment, to the competent authority.

S.4.2 Step #2 — Determination of the intrinsic ground risk class (iGRC)

S.4.2.1 Introduction

- (a) In this step, the UAS operator is required to assess the intrinsic ground risk of the operational volume and the ground risk buffer.
- (b) No ground risk mitigations will be applied at this step; this may be completed in Step #3.

S.4.2.2 Outcome

Calculation and documentation of the iGRC.

S.4.2.3 Task description**iGRC footprint**

- (a) Identify the maximum characteristic dimension and the maximum speed of the UA.
- (b) Identify the iGRC footprint:
 - (i) identify the flight geography;
 - (ii) calculate the contingency volume;
 - (iii) calculate the initial ground risk buffer (the final ground risk buffer calculation will be completed in Step #8).
- (c) Identify the highest population density within the iGRC footprint.
- (d) Identify the iGRC of the footprint using Table 2 for fixed-wing aircraft, rotorcraft-helicopters, rotorcraft-gyroplanes, VTOL-capable aircraft (including multirotors)¹.

¹ For lighter-than-air configurations, the UAS operator may propose a GRC based on the model defined in Annex F Edition 2.5, available at http://jarus-rpas.org/wp-content/uploads/2024/06/SORA-v2.5-Annex-F-Release.JAR_doc_29pdf.pdf.

UAS iGRC						
Maximum UA characteristic dimension		1 m	3 m	8 m	20 m	40 m
and						
Maximum speed		25 m/s	35 m/s	75 m/s	120 m/s	200 m/s
Maximum iGRC population density (people/km2)	Controlled ground area	1	1	2	3	3
	< 5	2	3	4	5	6
	< 50	3	4	5	6	7
	< 500	4	5	6	7	8
	< 5 000	5	6	7	8	9
	< 50 000	6	7	8	9	10
	> 50 000	7	8	Not part of SORA		
— A single UA with a take-off mass less than or equal to 250 g and having a maximum speed less than or equal to 25 m/s is considered to have an iGRC of 1 regardless of population density, unless operating over assemblies of people¹. — A UA that is not expected to penetrate a standard dwelling will get a –1 GRC reduction in Step #3 from the M1(A) sheltering mitigation when not flying over large outdoor assemblies of people and most of the people overflown are protected by adequate structures; see Annex B of this AMC for additional details.						

Table 1 — Intrinsic ground risk class (GRC) determination

- (e) For UA with a maximum characteristic dimension greater than 40 m, the iGRC should be calculated following the guidance in Appendices A and B to Annex F Edition 2.5².

S.4.2.4 Instructions

UA characteristics

- (a) For maximum UA characteristic dimension examples, refer to the definition of ‘UA characteristic dimensions’ in I.141 of [Annex I](#) to this AMC.
- (b) Maximum speed
- The maximum speed is conservatively defined as the maximum possible commanded airspeed of the UA, as defined by the UAS designer.
 - This is not the flight-specific maximum commanded airspeed of the UA as reducing the flight airspeed may not necessarily reduce the impact area³. Mitigations that limit

¹ Additional information may be found in Appendix II to NPA 2017-05 (B) ‘Introduction of a regulatory framework for the operation of drones — Unmanned aircraft system operations in the open and specific category’ (<https://www.easa.europa.eu/en/downloads/22496/en>).

² http://jarus-rpas.org/wp-content/uploads/2024/06/SORA-v2.5-Annex-F-Release.JAR_doc_29pdf.pdf

³ The reduction may not be guaranteed in case of a loss of control of the UA.

airspeed below the maximum speed value during an impact can be considered in Step #3, referring to [Annex B to AMC1 Article 11](#).

iGRC Footprint

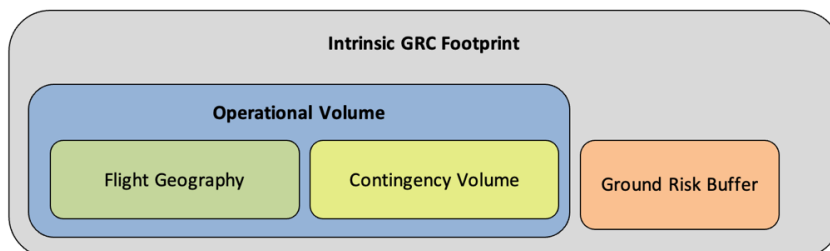


Figure 4 — Visualisation of the iGRC footprint

- (c) The UAS operator should have defined the area at risk when conducting the operation. This is defined as the iGRC footprint. It is composed of the operational volume plus the ground risk buffer as shown in Figure 5 above.
- (d) The operational volume is composed of the flight geography and the contingency volume (refer to Sections S.2.2.1, S.2.2.2 and S.2.2.3 respectively for additional information). To determine the operational volume, the UAS operator should consider the position-keeping capabilities of the UAS in 4D space (latitude, longitude, height and time). In particular, the accuracy of the navigation solution, the flight technical error of the UAS, the path definition error (e.g. map error) and latencies should be considered when determining the operational volume.
- (e) The iGRC footprint is used to determine the population density. It is expected that for many flights the iGRC footprint may cover segments with different population densities. The segment with the highest population density should be used when determining the iGRC.

Identification of the iGRC

- (a) The iGRC is found at the intersection of the applicable maximum population density and the rightmost column matching both criteria, the maximum UA characteristic dimension and the maximum speed in Table 2.
- (b) The UAS operator may provide substantiation to the competent authority for a different iGRC. See Appendix A of Annex F Edition 2.5¹ for further guidance.
- (c) UAS operations that do not have a corresponding iGRC (i.e. grey cells on the table) are outside the scope of the SORA methodology. In this case, UAS operators should consider the ‘certified’ category.
- (d) If population density values are not available or not accurate, the UAS operator may use qualitative descriptors for the iGRC table; the following approximations may be used as guidance:

Quantitative population value (people/km ²)	Qualitative descriptors	Area description

¹ http://jarus-rpas.org/wp-content/uploads/2024/06/SORA-v2.5-Annex-F-Release.JAR_doc_29pdf.pdf

Controlled ground area	Controlled ground / Extremely remote	Areas that are controlled where uninvolved people are not allowed to enter. Refer to point (21) of Article 2 of Implementing Regulation (EU) 2019/947 and related GM1.
< 5	Remote	Areas where people may be, such as forests, deserts, large farm parcels, etc. Areas where there is approximately one small building every km ² .
< 50	Lightly populated	Areas of small farms. Residential areas with very large lots (~ 4 acres or 16 000 m ²).
< 500	Sparsely populated / Residential lightly populated	Areas comprised of homes and small businesses with large lot sizes (~1 acre or 4 000 m ²).
< 5 000	Suburban / Low-density metropolitan	Areas of single-family homes on small lots, apartment complexes, commercial buildings, etc. Can contain multistorey buildings, but generally most should be below 3–4 stories.
< 50 000	High-density metropolitan	Areas of mostly large multistorey buildings. The downtown area of most cities. Areas of dense skyscrapers.
> 50 000	Assemblies of people	Refer to point (3) of Article 2 of Implementing Regulation (EU) 2019/947 and related GM1.

Table 2 — Correspondence between quantitative and qualitative assessment of the iGRC

Ground risk buffer

- (a) An appropriate initial ground risk buffer should be defined considering the principles outlined in criterion #3 of Section E.4 of [Annex E](#) of this AMC:
 - (i) with the 1-to-1 principle¹; or
 - (ii) a different ground risk buffer value may be proposed by the UAS operator using the principles outlined in Section 4, criterion #3 of [Annex E](#) of this AMC.
- (b) Cases where the final ground risk buffer may be different than the initial one could include:
 - (i) medium and high level of containment²;
 - (ii) use of ground risk mitigations, such as a parachute.

Controlled ground area

- (a) A controlled ground area is defined as the intended UAS operational area where only involved persons (if any) are present.
- (b) Controlled ground areas are a way to strategically mitigate the ground risk; the assurance that there will be no uninvolved persons in the iGRC footprint is under the full responsibility of the UAS operator. The competent authority may request evidence of how the UAS operator will ensure control of the ground area during operation.

Non-typical cases

¹ For the evaluation of the size of the ground risk buffer based on the 1:1 principle, see Section A.5.2.4 of Annex A.

² For additional information, refer to criterion #3 in Chapter E.4 of Annex E.

- (a) There are certain cases, for example aircraft whose maximum characteristic dimension and maximum speed differ significantly from the selected column, which may have a significant effect on the iGRC. Such cases may not be well represented in the iGRC table and may lead to an increase or decrease in the iGRC. See Section 1.8 of Annex F Edition 2.5¹ for further guidance.
- (b) A UAS operator may consider that the iGRC is too conservative for its UA. Therefore, a UAS operator may decide to calculate the iGRC by applying the mathematical model defined in Section 1.8 of Annex F Edition 2.5²⁶. The UAS operator should choose the column that matches the critical area calculated for the UA that is used, as identified in Table B.8 of [Annex B](#) to this AMC. An automatic tool to calculate the critical area of a UA is available on the EASA website².

Information on population density

- (a) Determining the population density to calculate the iGRC in Step #2 should be done using maps with appropriate grid size based on the intended operation. Competent authorities should designate specific maps to be used for determining population densities.
- (b) If there are no available population density maps acceptable to the competent authority, the qualitative population density descriptors (see Table 3) may be used to estimate the population density band in the operational volume and the ground risk buffer. Alternatively, the competent authority may require, or permit, UAS operators to provide appropriate population density maps. Table 4 below presents the suggested optimal grid size for different maximum heights of the operational volume.

Max. height (AGL) of the operational volume		Suggested optimal grid size (metre × metre)
Feet	Metres	
500	152	200 × 200
1 000	305	400 × 400
2 500	762	1 000 × 1 000
5 000	1 524	2 000 × 2 000
10 000	3 048	4 000 × 4 000
20 000	6 096	5 000 × 5 000
60 000	18 288	10 000 × 10 000

Table 4 — Suggested grid size for population density maps

- (c) The authority-designated map should be at the suggested optimal grid size. If mapping products do not exist at the suggested optimal grid size, the competent authority should use the closest grid size available. If the closest grid size available is smaller than the suggested optimal grid size, then the map should be smoothed to the suggested optimal grid size.
- (d) If the UAS operator identifies inaccuracies in the designated static population density map, it can provide alternative data (for example, by using other mapping products, satellite imagery, on-site inspections, local knowledge of the area, etc.) that demonstrates the correction in the estimated average population density of the area. If accepted by the competent authority, the UAS operator may use the alternative data to determine the iGRC. Use of time-based restriction

¹ http://jarus-rpas.org/wp-content/uploads/2024/06/SORA-v2.5-Annex-F-Release.JAR_doc_29pdf.pdf

² <https://www.easa.europa.eu/en/domains/drones-air-mobility/operating-drone/critical-area-assessment-tool-caat>

arguments (e.g. flying at night) for the reduction of the number of people at risk on the ground are addressed in SORA Step #3.

- (e) Additional information may be found in Section 3.2 of Annex F Edition 2.5¹.

S.4.3 Step #3 — Final ground risk class (GRC) determination (optional)

S.4.3.1 Introduction

- (a) The intrinsic risk of a person being struck by a UA during the loss of control of the operation can be reduced by means of acceptable mitigations.
- (b) In this step, the UAS operator may identify ground risk mitigations and reduce the GRC of the operation.

S.4.3.2 Outcome

- (a) Identification of the mitigations applied to reduce the iGRC for the iGRC footprint.
- (b) Identification of the applicable mitigations.
- (c) Determination of the final GRC by subtracting the credit derived by the mitigations from the iGRC.
- (d) Collection of information and references used to substantiate the application of the ground risk mitigation(s).

S.4.3.3 Task description

- (a) Identify the applicable mitigations listed in Table 5 that could lower the iGRC of the iGRC footprint. All mitigations should be applied in numerical sequence.

	Level of robustness		
	Low	Medium	High
Mitigations for ground risk			
M1(A) — Strategic mitigations — Sheltering	–1	–2	n/a
M1(B) — Strategic mitigations — Operational restrictions	n/a	–1	–2 ²
M1(C) — Tactical mitigations — Ground observation	–1	n/a	n/a
M2 — Effects of UA impact dynamics are reduced	n/a	–1	–2

Table 5 — Mitigations for the determination of the final GRC

- (b) Identify in [Annex B to AMC1 Article 11](#) the requirements to be complied with in order to receive appropriate credit for the mitigation.
- (c) If an M2 mitigation that affects the UA's descent behaviour is used, assess whether the size of the ground risk buffer defined in Step #2 is still valid.
- (d) Determine the final GRC by applying the appropriate correction to the iGRC.

¹ http://jarus-rpas.org/wp-content/uploads/2024/06/SORA-v2.5-Annex-F-Release.JAR_doc_29pdf.pdf

² The competent authority may decide to require UAS operators to use static population density maps augmented with the identification of the areas where the population density data is most probably incorrect and provide a corrective value (e.g. static population density maps may use as source census data where typically commercial, recreational, industrial and other areas are defined as unpopulated even if during some part of the day they may have a high population density value). In this case, the UAS operator may be allowed to claim a reduction of the iGRC higher than 2.

S.4.3.4 Instructions

Ground risk mitigations

- (a) Step #3 is optional.
- (b) The mitigations used to modify the iGRC have a direct effect on the safety objectives associated with an operation. Therefore, it is important to ensure their robustness. This has particular relevance for technical mitigations (e.g. parachute).
- (c) The final GRC determination is based on the availability and correct application of the mitigations to the operation. Table 5 provides a list of potential mitigations and the associated relative correction factor. All mitigations should be applied in numeric sequence to perform the assessment. [Annex B](#) to this AMC provides additional details on the robustness of each mitigation. Competent authorities may define or accept additional mitigations and the relative correction factors.
- (d) A quantitative approach to mitigations allows a reduction in the iGRC by 1 point if the mitigation reduces the population at risk to the next lowest iGRC population band. This is in most cases approximately a factor of 10 (90 % reduction) compared to the risk that is assessed before mitigations are applied. Such quantitative criteria should be used to validate the risk reduction that is claimed when applying [Annex B](#) to this AMC.
- (e) In rare situations, iGRC reductions greater than the ones shown in Table 5 may be possible. Refer to [Annex B](#) to this AMC for further guidance.
- (f) When applying all the M1 mitigations, the final GRC cannot be reduced to a value lower than the lowest value in the applicable column in Table 2. This is because it is not possible to reduce the number of people at risk below that of a controlled ground area.
- (g) If the mitigation influences the descent behaviour of the UA, for example by using a parachute, the ground risk buffer size should be redefined using the updated assumptions including the effects of the mitigations.
- (h) Additional information may be found in Chapter A.3 of [Annex A](#) to this AMC regarding guidance on presenting the data that supplements the risk assessment to the competent authority.

What if the final GRC is greater than 7?

If the final GRC is greater than 7, the operation is considered to pose a greater risk than the SORA is designed to support. The UAS operator may consider other options such as using the 'certified' category or changing the characteristics of the UAS operation in Step #1 (as stated in Figure 1).

S.4.4 Step #4 — Determination of the initial air risk class (iARC)

S.4.4.1 Introduction to the air risk assessment process

- (a) The SORA uses the operational airspace defined in Step #1 as the baseline to evaluate the intrinsic risk of mid-air collision with manned aircraft and for determining the iARC. The iARC may be modified (lowered) by applying strategic and tactical mitigations. An example of strategic mitigations to reduce mid-air collision risk may be by operating during certain times or within certain boundaries. After applying strategic mitigations, any residual mid-air collision risk is addressed by means of tactical mitigations.
- (b) Tactical mitigations take the form of detect-and-avoid systems or alternative collaborative means, such as ADS-B, systems transmitting on the SRD 860 frequency band, U-space services¹

¹ Some U-space services could also be used as strategic mitigations.

or operational procedures. Depending on the residual mid-air collision risk, the tactical mitigation performance requirement(s) may vary.

- (c) As part of the SORA process, the UAS operator should cooperate with the relevant service provider (e.g. ANSP or U-space service provider) for the airspace it intends to operate and obtain the necessary authorisations. Additionally, generic local authorisations or local procedures allowing access to a certain portion of airspace may be used if available. The competent authority or the ANSP may impose additional strategic or tactical mitigations on airspace authorisations, taking into account uncertainties relating to UA reliability, conspicuity, and other factors.
- (d) The SORA recommends that, irrespective of the results of the risk assessment, the operator pay particular attention to all features that may increase the detectability of the UA in airspace. Therefore, technical solutions that improve the electronic conspicuousness or detectability of the UAS are recommended.

S.4.4.2 Outcome

- (a) Identification of the risk of mid-air collision between the UA and a manned aircraft.
- (b) Documentation of information and references used to determine the iARC of the operational volume.

S.4.4.3 Task description

Operational volume

- (a) Identify the vertical limit of the operational volume:
 - (i) identify the vertical limit of the flight geography;
 - (ii) identify and document the contingency procedures in case the UA exceeds the height of the flight geography;
 - (iii) evaluate the maximum height the UA will travel above the limit of the flight geography when applying the contingency procedures before it enters again in the flight geography.
- (b) Check whether there are official airspace collision risk maps available. The competent authority or the ANSP may elect to directly map the airspace collision risks using airspace characterisation studies. These maps would directly show the initial/residual air risk class (ARC) for a particular airspace. If the competent authority, the ANSP or the U-space service provider provides an air collision risk map (static or dynamic), the UAS operator should use that service to determine the initial/residual ARC and go directly to Section S.4.5 'Application of strategic mitigations' to reduce the iARC, provided that a further reduction is still possible.
- (c) If point (b) is not applicable, identify the iARC of the operational volume using the decision tree in Figure 6.

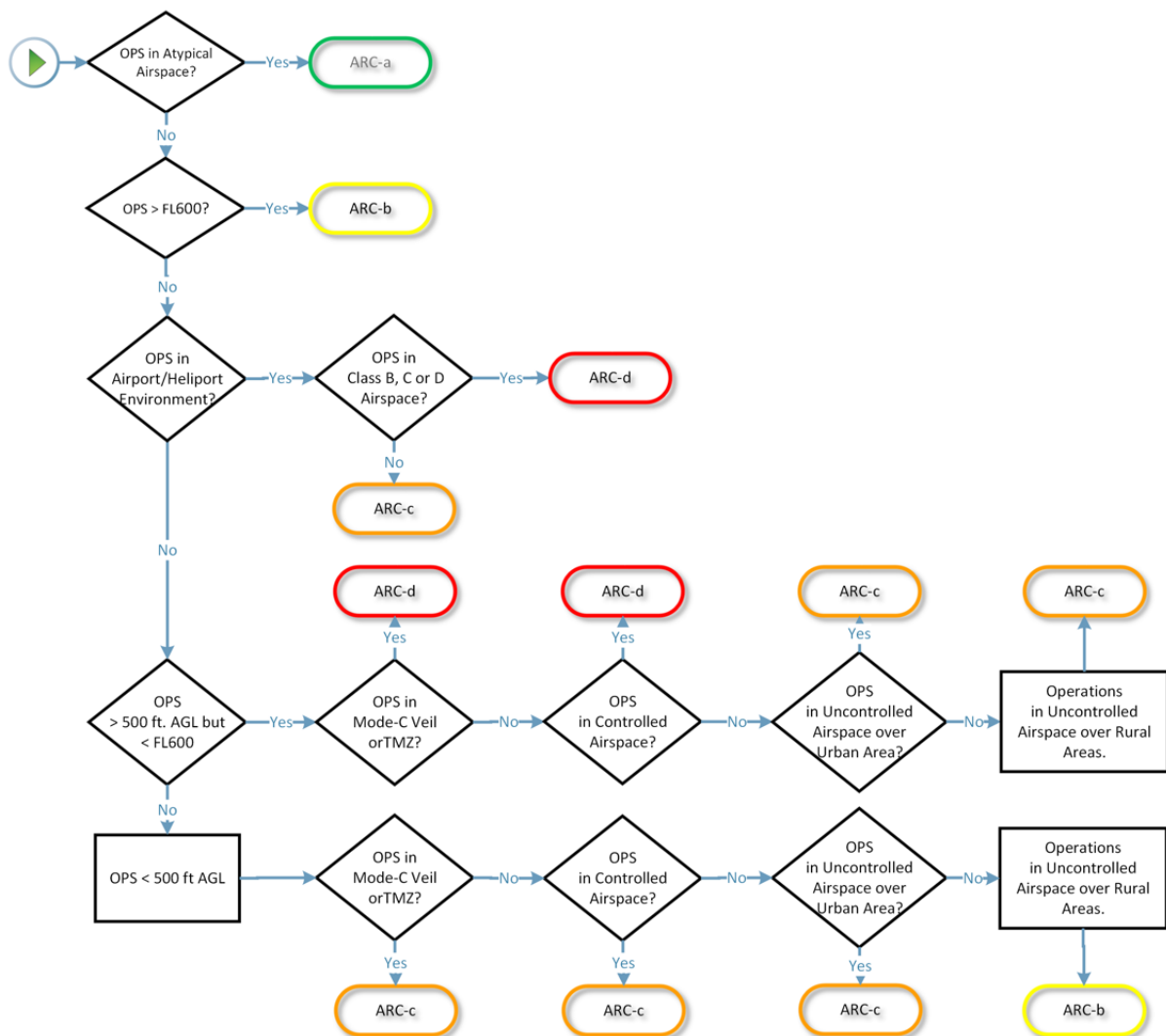


Figure 5 — ARC assignment process

S.4.4.4 Instructions

Identification of the iARC

- As seen in Figure 6, the airspace is categorised into 12 aggregated collision risk categories. These categories are characterised by altitude, controlled versus uncontrolled airspace, airport/heliport versus non-airport/non-heliport environments, airspace over urban versus rural areas, and lastly atypical (e.g. segregated) versus typical airspace. The categories correspond to the airspace encounter classes (AECs), which provide a further qualitative delineation of non-mitigated collision risk that is elaborated in [Annex C](#) to this AMC.
- During a UAS operation, the operational volume may span many different airspace environments. The UAS operator should conduct an air risk assessment for the entire range of the operational volume. An example scenario of operations in multiple airspace environments is provided at the end of [Annex C](#) to this AMC.
- The ARC is a qualitative classification of the rate at which a UAS would typically encounter a manned aircraft within that volume of airspace. The ARC is an initial assignment of the aggregated collision risk for the airspace before mitigations are applied. The actual collision risk for a specific local operational volume could be much different and can be addressed in the

application of strategic mitigations to reduce the ARC section (this step is optional; see Step #5 in Section S.4.5).

- (d) Although the non-mitigated risk captured by the initial ARC is conservative, there may be situations where that conservative assessment may not suffice. It is important that both the competent authority and the operator take great care to understand the operational volume and under what circumstances the definitions in Figure 6 could be invalidated. In some situations, the competent authority may raise the operational volume's initial ARC to a level which is higher than that indicated in Figure 6. The ANSP should be consulted to assure that the assumptions related to the operational volume are accurate.
- (e) The competent authority may designate parts of its airspace as atypical. ARC-b, ARC-c and ARC-d generally define airspace with an increasing risk of collision between a UAS and manned aircraft.

Identification of the vertical limit of the operational volume

- (a) The vertical limit of the flight geography is the maximum height where the UA is planned to operate in normal conditions.
- (b) On top of the flight geography, the UAS operator should identify the extent of the contingency volume as the maximum height the UA will travel when applying the contingency procedures.

Atypical air environment

- (a) An atypical air environment (leading to ARC-a classification) is defined as airspace where the risk of collision between a UAS and manned aircraft is acceptably low without the application of any tactical mitigations. This is usually the case when it can be generally expected that no manned aircraft use the airspace volume that is intended for the operation.
- (b) Examples may include operation in reserved or restricted airspace (e.g. by means of a temporary segregated airspace), or operation at very low altitudes (including in close proximity to obstacles) in those areas where manned aircraft generally do not operate¹.

S.4.5 Step #5 — Application of strategic mitigations to determine residual ARC (optional)

S.4.5.1 Introduction

- (a) The ARC is a qualitative classification of the rate at which a UA would encounter a manned aircraft in a given airspace environment. However, it is recognised that the operational volume may have a collision risk that differs from the iARC assigned.
- (b) If the UAS operator considers that the iARC assigned is too high for the condition in the local operational volume, then refer to Annex C to this AMC for the ARC reduction process.
- (c) If the UAS operator considers that the iARC assignment is correct for the condition in the local operational volume, then that iARC becomes the residual ARC.

¹ Refer to definition I.19 'Authority' in Annex I to AMC1 to Article 11.

S.4.5.2 Outcome

- (a) Identification of the strategic mitigations applied to reduce the iARC of the operational volume.
- (b) Identification of the residual ARC.
- (c) Documentation of information and references used to support the application of strategic mitigations.

S.4.5.3 Task description

- (a) Identify the applicable strategic mitigations listed in Section 5 of [Annex C](#) to this AMC.
- (b) Identify the residual ARC of the operational volume following the process listed in Section 6 of Annex C to this AMC.
- (c) Refer to Chapter A.3 of [Annex A](#) to this AMC for further guidance on how to present the data that supplements the risk assessment to the authority.
- (d) If flying in VLOS, consider the additional guidance below.

S.4.5.4 Instructions**Application of strategic mitigations**

For VLOS operations, or for BVLOS operations where the remote pilot is supported by one or multiple airspace observers (located in a way that the UA is always at a VLOS distance from the remote pilot or from one airspace observer that is able to scan the sky and communicate in real time with the remote pilot informing them of possible other manned or unmanned aircraft flying in the area of operation¹), the initial ARC can be reduced by one class. In these conditions, the crew is assumed to have the ability to assess other aircraft activity in the airspace concerned and therefore is able to lower the encounter rate by applying this mitigation both before and during the operation. The mitigation cannot be used to reduce the ARC to ARC-a. In ARC-d environments, agreement with ATC may be required².

S.4.6 Step #6 — Tactical mitigation performance requirement (TMPR) and robustness levels**S.4.6.1 Introduction**

Tactical mitigations are applied to mitigate any residual risk of a mid-air collision in order to achieve the applicable airspace safety objective.

S.4.6.2 Outcome

- (a) Identification of the applicable TMPR and corresponding level of robustness.
- (b) Collection of information and references to be used to support compliance with the TMPR.

S.4.6.3 Task description

Identify whether flying in VLOS, BVLOS or BVLOS with AOs.

VLOS operations or BVLOS with airspace observers (AOs)

- (a) Develop and document a VLOS deconfliction scheme, in which it is explained which methods will be used for detection; and
- (b) Define the associated criteria applied for the decision to avoid incoming traffic. If the remote pilot relies on AOs for detection, the use of phraseology will have to be described as well.

¹ This type of operations is sometimes referred to as 'EVLOS'.

² This information will be reflected in a future version of Annex C.

BVLOS operations

- (a) Identify the applicable TMPR level deriving it from the residual ARC using Table 6.
- (b) Identify the applicable TMPR according to Section 5 of Annex D to this AMC.

Refer to Chapter A.3 of [Annex A](#) to this AMC for further guidance on how to present the data that supplements the risk assessment to the authority.

Residual ARC	TMPR and corresponding level of robustness
ARC-d	High
ARC-c	Medium
ARC-b	Low
ARC-a	No requirement

Table 6 — Tactical mitigation performance requirements (TMPR) and assignment of the TMPR level of robustness

S.4.6.4 Instructions

Application of tactical mitigations

Tactical mitigations will take the form of either ‘see and avoid’ (i.e. operations in VLOS) or may require a system which provides an alternate means of achieving the applicable airspace safety objective (operation using a detect-and-avoid (DAA) system or multiple DAA systems). Annex D to AMC1 Article 11 provides the method for applying tactical mitigations.

VLOS operations or BVLOS with airspace observers (AOs)

- (a) VLOS operations or BVLOS with AOs are considered an acceptable tactical mitigation for collision risk for all ARC levels.
- (b) Notwithstanding the above, the operator is advised to consider additional means to increase situational awareness with regard to air traffic operating in the vicinity of the operational volume.
- (c) In the case of multiple flight segments, those segments flown in VLOS or in BVLOS with AOs do not have to meet the TMPR nor the TMPR robustness requirements, whereas those flown in BVLOS do need to meet the TMPR and the TMPR robustness requirements.
- (d) In general, the VLOS requirements are applicable when one or more airspace observers are employed. In this case, additional requirements beyond VLOS should be proposed, including the definition of procedures and phraseology. The communication latency between the remote pilot and the airspace observer(s) should be less than 15 seconds.
- (e) For BVLOS operations with AOs, it is assumed that an airspace observer is not able to detect traffic beyond 2 NM (approximately 3,7 km). (Note that the 2 NM range is not a fixed value and may largely depend on atmospheric conditions, aircraft size, geometry, closing rate, etc.) Therefore, the operator may have to adjust the operation and/or the procedures accordingly.

Tactical mitigation performance requirement (TMPR) levels

- (a) **High TMPR (ARC-d):** The ARC-d level is assigned to airspace where either the manned aircraft encounter rate is high and/or the available strategic mitigations are low. Therefore, the resulting residual collision risk is high and the TMPR level is also high. In such airspace, the UA may be operating in integrated airspace (e.g. integrated with manned aircraft) and will have to comply with the operating rules and procedures applicable to that airspace, without reducing existing capacity, decreasing safety, negatively impacting current operations with manned aircraft, or increasing the risk to airspace users or persons and property on the ground. These are the same requirements as for the integration of comparable new and novel technologies in

manned aviation. The performance level(s) of those tactical mitigations and/or the required variety of tactical mitigations is generally higher than for the other ARCs. If operations in this airspace are conducted more routinely, the competent authority is expected to require the operator to comply with the recognised DAA system standards (e.g. those developed by RTCA SC-228 and/or EUROCAE WG-105).

- (b) **Medium TMPR (ARC-c):** A medium TMPR will be required for operations in airspace with a moderate likelihood of encountering manned aircraft and/or where the available strategic mitigations have medium robustness. Operations with a medium TMPR will likely be supported by systems currently used in aviation to aid the remote pilot in detecting other manned aircraft or by systems which are designed to support aviation and which are built to a corresponding level of robustness. Traffic avoidance manoeuvres for a medium TMPR could be more advanced than for a low TMPR.
- (c) **Low TMPR (ARC-b):** A low TMPR will be required for operations in airspace where the likelihood of encountering a manned aircraft is low but not negligible and/or where strategic mitigations address most of the risk and the resulting residual collision risk is low. Operations with a low TMPR are supported by technologies that are designed to aid the remote pilot in detecting other traffic, but which may be built to lesser standards. For example, for operations below 500 ft AGL, the traffic avoidance manoeuvres are expected to mostly be based on a rapid descent to an altitude where manned aircraft are not expected to ever operate.
- (d) **No TMPR (ARC-a):** This is airspace where the manned aircraft encounter rate is expected to be extremely low and, therefore, there is no need for a TMPR. It is defined as airspace where the risk of collision between a UA and manned aircraft is acceptable without the addition of any tactical mitigation. An example of this may be UAS flight operations in some parts of northern Sweden where the manned aircraft density is so low that the airspace safety threshold could be met without any tactical mitigation.
- (e) Annex D to this AMC provides information on how to satisfy the TMPR based on the available tactical mitigations and the TMPR level of robustness.

Guidance on airspace/operational requirements

- (a) Modifications to the initial and subsequent approvals may be required by the competent authority or the ANSP should safety and operational issues arise.
- (b) The operator and the competent authority need to be aware that ARCs are a generalised qualitative classification of collision risks. Local circumstances could invalidate the aircraft density assumptions of the SORA, for example with special events. It is important that both the competent authority and the operator fully understand the airspace and air traffic flows, and develop a system which can alert operators to changes to the airspace on a local level. This will allow the operator to safely address the increased risks associated with these events.
- (c) There are many airspace, operational and equipment requirements which have a direct impact on the collision risk of all aircraft that operate in a particular airspace volume. Some of these requirements are general and apply to all airspace volumes, while some are local and are required only for a particular airspace volume. The SORA cannot possibly cover all the possible requirements required by the competent authority for all conditions in which the operator may wish to operate. The UAS operator and the competent authority need to work closely together to define and address these additional requirements.
- (d) The SORA process should not be used to support UAS operations in a given airspace volume without the UAS being equipped with the required equipment for operations in that airspace volume (e.g. equipment required to ensure interoperability with other airspace users). In these

cases, specific exemptions may be granted by the competent authority. Those exemptions are outside the scope of the SORA.

- (e) Operations in controlled airspace, in an airport/heliport environment or in a Transponder Mandatory Zone (TMZ) will likely require prior approval from the ANSP. The UAS operator should ensure that it coordinates with the relevant ANSP/authority prior to commencing operations in these environments.

S.4.7 Step #7 — Determination of the specific assurance and integrity level (SAIL)

S.4.7.1 Introduction

- (a) The SAIL parameter consolidates the ground and air risk analyses and drives the required activities.
- (b) The SAIL represents the level of confidence that the UAS operation will remain in control.

S.4.7.2 Outcome

Identification of the SAIL.

S.4.7.3 Task description

Identify the SAIL associated with the proposed operation deriving it from the final GRC and the residual ARC using Table 7.

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	Operation classified in the 'certified' category			

Table 3 — SAIL determination

S.4.7.4 Instructions

- (a) The level of confidence that the UAS operation will remain in control is represented by the SAIL.
- (b) The SAIL is not quantitative but instead corresponds to:
 - (i) the level of the OSO robustness to be complied with (see Table 14);
 - (ii) the description of activities that might support compliance with the OSOs; and
 - (iii) the evidence that indicates the OSOs have been satisfied.

S.4.8 Step #8 — Determination of the containment requirements**S.4.8.1 Introduction**

- (a) The containment requirements ensure that the target level of safety can be met for both ground and air risk in the adjacent ground area.
- (b) The containment requirements are derived from the difference between the final ground risk level in the operational volume plus the ground risk buffer and the final ground risk level in the adjacent ground area.
- (c) There are three possible levels of robustness for containment: 'low', 'medium' and 'high', each with a set of safety requirements described in [Annex E](#) to this AMC.

S.4.8.2 Outcome

- (a) A set of operational limitations for the population in the adjacent ground area.
- (b) A derived level of robustness for containment.

S.4.8.3 Task description

- (a) If the UA has a take-off mass of less than 250 g, apply low containment with no required operational limitations for the population in the adjacent ground area and go to Step #9. Otherwise, apply point (b).
- (b) Determine the size and the population characteristics of the adjacent ground area:
 - (i) calculate the size of the adjacent ground area for the operation; the lateral outer limit of the adjacent ground area is calculated from the operational volume as the distance flown by the UA in 3 minutes at maximum speed:
 - (A) if the distance is less than 5 km, use 5 km;
 - (B) if the distance is between 5 and 35 km, use the distance calculated;
 - (C) if the distance is greater than 35 km, use 35 km;
 - (ii) calculate the average population density between the outer limit of the ground risk buffer and the outer limit of the adjacent ground area;
 - (iii) develop procedures to assess the potential presence of outdoor assemblies of people, during the time when the flight takes place, within 1 km of the outer limit of the operational volume.
- (c) Determine a set of operational limitations appropriate for the UAS operation using the columns in Tables 8 to 13.
 - (i) Choose an operational limitation for the acceptable average population density in the established adjacent ground area.
 - (ii) Choose an operational limitation for the acceptable size of assemblies of people within 1 km surrounding the operational volume.
- (d) Use Tables 8 to 13 to identify the required containment robustness level based on the characteristic dimension of the UA and the SAIL of the operation, considering the most stringent between the value of the average population density and the outdoor assembly of people.

1 m UA (< 25 m/s) Sheltering assumed applicable for the UA in the adjacent ground area ¹			
Average population density allowed	No upper limit		< 50 000 people/km ²
Outdoor assemblies allowed within 1 km of the operational volume	> 400k	Assemblies of 40k to 400k	Assemblies of < 40k
SAIL			
I & II	High	Medium	Low
III	Medium	Low	Low
IV, V -& VI	Low	Low	Low

Table 8 — Containment requirements for a UA up to 1 m UA with shelter assumption

3 m UA (< 35 m/s) Shelter assumed applicable for the UA in the adjacent ground area ³²				
Average population density allowed	No upper limit		< 50 000 people/km ²	< 5 000 people/km ²
Outdoor assemblies allowed within 1 km of the operational volume	> 400k	Assemblies of 40k to 400k	Assemblies of < 40k people	
SAIL				
I & II	Out of scope	High	Medium	Low
III	Out of scope	Medium	Low	Low
IV	Medium	Low	Low	Low
V & VI	Low	Low	Low	Low

Table 9 — Containment requirements for a UA up to 3 m with shelter assumption

3 m UA (< 35 m/s) Shelter assumed not applicable for the UA in the adjacent ground area				
Average population density allowed	No upper limit	< 50 000 people/km ²	< 5 000 people/km ²	< 500 people/km ²
Outdoor assemblies allowed within 1 km of the operational volume	> 400k	Assemblies of 40k to 400k	Assemblies of < 40k people	
SAIL				
I & II	Out of scope	High	Medium	Low
III	Out of scope	Medium	Low	Low
IV	Medium	Low	Low	Low
V & VI	Low	Low	Low	Low

Table 10 — Containment requirements for a UA up to 3 m without shelter assumption

8 m UA (< 75 m/s) Sheltering assumed not applicable for the UA in the adjacent ground area					
Average population density allowed	No upper limit	< 50 000 people/km ²	< 5 000 people/km ²	< 500 people/km ²	< 50 people/km ²
Outdoor assemblies allowed within 1 km of the operational volume	> 400k	Assemblies of 40k to 400k	Assemblies of < 40k		

¹ Refer to Table B.2 'Level of integrity assessment criteria for M1(A) mitigation' of Annex B to AMC1 Article 11 for guidance on how to evaluate the applicability of the sheltering effect.

SAIL					
I & II	Out of scope	Out of scope	High	Medium	Low
III	Out of scope	Out of scope	Medium	Low	Low
IV	Out of scope	Medium	Low	Low	Low
V	Medium	Low	Low	Low	Low
VI	Low	Low	Low	Low	Low

Table 11 — Containment requirements for a UA up to 8 m

20 m UA (< 120 m/s) Sheltering assumed not applicable for the UA in the adjacent ground area					
Average population density allowed	No upper limit	< 50 000 people/km ²	< 5 000 people/km ²	< 500 people/km ²	< 50 people/km ²
Outdoor assemblies allowed within 1 km of the operational volume	> 400k	Assemblies of 40k to 400k	Assemblies of < 40k		
SAIL					
I & II	Out of scope	Out of scope	Out of scope	High	Medium
III	Out of scope	Out of scope	Out of scope	Medium	Low
IV	Out of scope	Out of scope	Medium	Low	Low
V	Out of scope	Medium	Low	Low	Low
VI	Medium	Low	Low	Low	Low

Table 12 — Containment requirements for a UA up to 20 m

< 40 m UA (< 200 m/s) Sheltering assumed not applicable for the UA in the adjacent ground area					
Average population density allowed	No upper limit	< 50 000 people/km ²	< 5 000 people/km ²	< 500 people/km ²	< 50 people/km ²
Outdoor assemblies allowed within 1 km of the operational volume	> 400k	Assemblies of 40k to 400k	Assemblies of < 40k		
SAIL					
I & II	Out of scope	Out of scope	Out of scope	Out of scope	High
III	Out of scope	Out of scope	Out of scope	Out of scope	Medium
IV	Out of scope	Out of scope	Out of scope	Medium	Low
V	Out of scope	Out of scope	Medium	Low	Low
VI	Out of scope	Medium	Low	Low	Low

Table 13 — Containment requirements for a UA up to 40 m

- (e) Ensure the operation complies with the containment requirements listed in [Annex E](#) Section 4.

S.4.8.4 Instructions

Refer to Chapter A.3 of [Annex A](#) to this AMC for further guidance on how to present the data that supplements the risk assessment to the competent authority.

Adjacent ground area

- (a) The adjacent ground area represents the ground area adjacent to the ground risk buffer where it is reasonably expected that a UA may crash after a loss-of-control situation resulting in a fly-away.
- (b) The operator is not approved to plan flights in this area, and it should only be overflown unintentionally in the event of a loss of control that results in a fly-away.
- (c) As regards the situation in point (b), the direction and duration of the fly-away is assumed to be random, thus the average population density of the adjacent ground area is used, instead of the maximum as is done in Step #2.
- (d) Conservative simplifications for calculating the average population density may be used by the operator when compliance with the operational limitations can be assured.

Calculating the size of the adjacent ground area

The diagram below in Figure 7 depicts how to determine the size of the adjacent ground area.

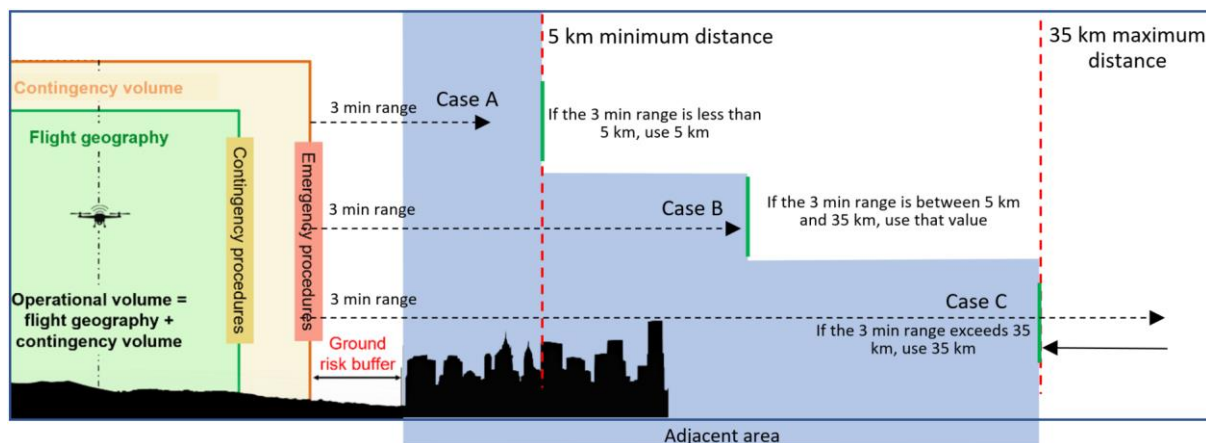


Figure 6 — Lateral limits — Adjacent ground area

If the ground risk buffer is larger than the adjacent ground area, then the assessment of the adjacent ground area is not required.

Adjacent ground area containment requirements

- (a) When using Tables 8 to 13 to identify the required containment robustness level of the operation:
 - (i) select the correct table based on the maximum characteristic dimensions of the UA used in Step #2;
 - (A) for a 3 m UA determine whether sheltering can be applied in the adjacent ground area, using similar considerations applied in Step #3;
 - (B) if sheltering applies for a UA greater than 3 m, the operator may use Annex F Edition 2.5¹ to apply the credit and determine the appropriate containment requirements;
 - (ii) identify the correct row based on the SAIL found in Step #7;

¹ http://jarus-rpas.org/wp-content/uploads/2024/06/SORA-v2.5-Annex-F-Release.JAR_doc_29pdf.pdf

- (iii) identify the appropriate column to derive the containment level of robustness based on the adjacent ground area population density;
 - (iv) if the results are 'out of scope', the operation cannot be conducted in the 'specific' category; in this case, adjusting the location of the operation or an increase of the SAIL of the operation could be considered.
- (b) *Example:* An operation uses a SAIL III 2.5 m UA with a maximum speed of 30 m/s, sheltering is applicable, the outer limit of the adjacent ground area is 5.4 km from the boundary of the operational volume. An assessment of the adjacent ground area shows no large outdoor assemblies of people within 1 km and such area spans mostly rural and suburban areas, expecting an average population density between 1–4k people/km². This results in low containment requirements. If the UAS operator decides to use a UA with low containment, the operator should document the operational limitations for the low containment SAIL III UA:
- (i) no assemblies of people > 40k within 1 km of the operational volume;
 - (ii) the adjacent ground area (5.4 km from the operational volume) average population density should not exceed 50 000 people/km².

Operational limitations regarding adjacent ground area

- (a) The UAS operator should define operational limitations that have to be adhered to when planning the operational volume for a flight operation.
- (b) The UAS operator should have a procedure to identify and take into account scheduled outdoor assemblies of people in excess of the operational limitations within 1 km of the outer limit of the operational volume. The values for the size of assemblies of people are to be understood as rough order of magnitude guidelines since measuring the actual values is not practical.
- (c) If the ground risk buffer size exceeds 1 km, the adjacent ground area consideration for all assemblies of people is not applicable.

Inclusion of the containment feedback loop into the definition of the ground risk buffer and operational volume

- (a) If the UAS operator determines that a medium or high robustness containment is required for its operational objectives, there might be a recursive effect. If a high level of containment is required, the calculation of the ground risk buffer size may need to be repeated using the requirements defined in criterion #3 of Chapter E.4 of [Annex E](#) to this AMC. It is possible that this results in a bigger ground risk buffer size compared to the one defined by the UAS operator in Step #1.
- (b) If this is the case, the UAS operator needs to go back to Step #2 and re-evaluate the GRC.
- (c) Alternatively, the UAS operator may choose to reduce the size of the operational volume described in Step #1 to allow for a greater ground risk buffer.

Containment requirements for adjacent airspace

By containing the flight within the operational volume and assuring the immediate cessation of the flight in case of an unlikely breach of the operational volume, low robustness containment is generally considered sufficient to allow operations to be conducted adjacent to all airspace volumes.

S.4.9 Step #9 — Identification of the operational safety objectives (OSOs)

S.4.9.1 Introduction

This step of the SORA process is to map the operation's SAIL score to the required levels of robustness of the OSOs.

S.4.9.2 Outcome

- Identification of the required robustness levels of the individual OSOs.
- Collection of information and references to be used to show compliance with the OSO requirements.

S.4.9.3 Task description

- Identify the level of robustness of each OSO, deriving it from the SAIL of the proposed operation using Table 14.

OSO ID		SAIL						Dependencies (Criteria references as per Annex E)		
		I	II	III	IV	V	VI	Operator	Training organisat ion	Designer
OSO #01	Ensure that the UAS operator is a competent and/or proven organisation	NR	L	M	H	H	H	x		
OSO #02	UAS designed and produced by a competent and/or proven organisation	NR	NR	L	M	H	H			x ¹
OSO #03	UAS maintenance	L	L	M	M	H	H	Crit. #2 Crit. #3		Crit. #1
OSO #04	UAS components essential to safe operations are designed to an airworthiness design standard	NR	NR	NR	M	H	H			x
OSO #05	UAS is designed considering system safety and reliability	NR	NR	L	M	H	H			x
OSO #06	C3 link characteristics (e.g. performance spectrum use) are appropriate for the UAS operation	NR	L	L	M	H	H	Crit. #1		Crit. #2
OSO #07	Conformity check of the UAS configuration	L	L	M	M	H	H	x		
OSO #08	Operational procedures are defined, validated and adhered to	L	M	H	H	H	H	Crit. #2 Crit. #3 Crit. #4		Crit. #1
OSO #09	Remote crew trained and current	L	L	M	M	H	H	x	x	
OSO #13	External services supporting UAS operations are adequate for the UAS operation	L	L	M	H	H	H	x		
OSO #16	Multi-crew coordination	L	L	M	M	H	H	Crit. #1 Crit. #3	Crit. #2	
OSO #17	Remote crew is fit to operate	L	L	M	M	H	H	x		
OSO #18	Automatic protection of the flight envelope from human errors	NR	NR	L	M	H	H			x

¹ Annex E of this AMC includes requirements for both design and production organisations.

OSO #19	Safe recovery from human error	NR	NR	L	M	M	H			x
OSO #20	A human factors evaluation has been performed and the HMI found appropriate for the intended UAS operation	NR	L	L	M	M	H			x
OSO #23	Environmental conditions for safe operations defined and measurable	L	L	M	M	H	H			x
OSO #24	UAS designed and qualified to operate in adverse environmental conditions	NR	NR	M	H	H	H			x

Table 14 — Recommended operational safety objectives (OSOs)

- (b) Refer to [Annex E](#) to this AMC for the integrity and assurance requirements of each OSO based on its level of robustness:
- (i) identify the requirements for procedures and document them accordingly;
 - (ii) identify the technical requirements for the UAS and document them accordingly;
 - (iii) identify the training requirements for the personnel essential for the safety of the operation and document them accordingly.
- (c) For OSO #5, see further guidance in [Annex E](#) to this AMC regarding UAS designs that employ novel or complex features for which very limited operational experience is available and are intended to be operated in SAIL II.

S.4.9.4. Instructions

- (a) Table 14 is a consolidated list of common OSOs that historically have been used to ensure safe UAS operations. It represents the gained experience of many experts and is, therefore, a solid starting point to determine the required safety objectives for a specific operation.
- (b) While the operator is the organisation responsible for showing compliance with all OSOs, some of the evidence may be developed by other organisations such as the UAS designer or the training organisation, as identified in Table 14.
- (c) Table 14 indicates the corresponding OSOs. In this table:
- (i) 'NR' stands for 'not required' to show compliance to the competent authority; however, the applicant is encouraged to consider the operational safety objective at a low integrity level;
 - (ii) 'L' stands for 'low' robustness;
 - (iii) 'M' stands for 'medium' robustness;
 - (iv) 'H' stands for 'high' robustness.

S.4.10 Step #10 — Comprehensive safety portfolio (CSP)

S.4.10.1 Introduction

- (a) The final step of the SORA involves the compilation of the CSP.
- (b) The CSP is a structured argument using the SORA process that is supported by a body of evidence which provides a robust safety case. This demonstrates that the proposed operation has been assessed correctly and meets its SORA objectives.

S.4.10.2 Outcome

- (a) A completed CSP should be provided to the competent authority for the application for the issue of an operational authorisation.
- (b) By documenting all the elements of the SORA, the competent authority can assess a standardised document suite that provides assurance that the SORA process has been completed correctly and the operation can be conducted safely.

S.4.10.3 Task description

- (a) Finalise and present all the documentation that needs to be included in the CSP. This should include the following:
 - (i) The finalised **detailed operational description** from Step #1 that details the proposed operation(s), providing the air and ground risk information necessary to validate the safety claims within the proposed operational context.
 - (ii) All **safety claims**, and their robustness, made through Steps #2 (iGRC), #3 (M1(A), M1(B), M1(C), M2), #4 (initial ARC), #5 (Strategic Mitigations for Air Risk), updated (if required) from Phase 1 to reflect the finalised operation.
 - (iii) All **derived requirements** based on the safety claims; the final GRC, the residual ARC, TMPRs, the OSOs associated with the SAIL, and the containment requirements.
 - (iv) **Compliance evidence**, which comprises of data, facts and information that provide the necessary justification for each of the safety claims and derived requirements made through the SORA process at the robustness level required. The CSP covers operational, technical, personnel and organisational compliance evidence.
 - (v) The necessary linkages and references between documents that ensure the CSP makes a **justified safety case** that demonstrates the operation has satisfied all required SORA safety claims and derived requirements.
 - (vi) It is expected that a finalised **compliance matrix** (based on the initial compliance matrix, if developed in Phase 1) will be used to map the safety claims and derived requirements to the compliance evidence.
- (b) Refer to [Annex A](#) to this AMC for more guidance on how to structure documentation as part of the CSP.

S.4.10.4 Instructions

- (a) The UAS operator should only put information into the CSP as required by the items mentioned in paragraph S.4.10.3. If a requirement has a low robustness (refer to Section S.2.4), it is mostly sufficient to self-declare the compliance by a statement in the CSP. The SORA requirements for self-declaration in no way prevent the competent authority from requesting further documents to validate the declaration, if considered necessary for the given operation.
- (b) The CSP is expected to be a collection of documents specific to the UAS operation(s). It can be modularised and can consist of multiple documents and subsections to accommodate the need to perform the UAS operation(s).
- (c) Appropriate references and version/configuration control apply to all documents in the CSP, including subsections and other documents. Chapter A4 of [Annex A](#) to this AMC provides a template that could be used for developing the CSP that is in line with the requirements of this AMC. The competent authority may require a separate process for any change to be made. The management of any change should follow the relevant competent authority's requirements.

- (d) A completed and valid CSP forms the basis for the issue of an operational authorisation.
- (e) If the operator uses external service(s), reference(s) to the service level agreement(s) (SLA(s)) providing a delineation of responsibilities between the service provider(s) and the operator should be included in the CSP. It should also detail the functionality, limitations and performance of the external service(s).

Annex A to AMC1 Article 11

ED Decision 2025/018/R

GUIDELINES ON COLLECTING AND PRESENTING INFORMATION ON SYSTEMS AND OPERATIONS REGARDING UAS OPERATIONS CONDUCTED IN THE 'SPECIFIC' CATEGORY

The purpose of this Annex is to provide guidance to UAS operators for collecting and presenting evidence and data required when compiling an application to obtain operational authorisation for UAS operations in the 'specific' category.

This document does not replace civil regulations but provides recommendations and guidance as to how UAS operators can comply with those regulations using the SORA process.

This document is composed of the following five chapters:

- **A.1: Key principles for completing the application documents for UAS operations to be conducted in the 'specific' category**
It explains the different documents and how to use them to compile an application.
- **A.2: SORA risk assessment template**
It is intended to support UAS operators in compiling all the information necessary to perform a risk assessment.
- **A.3: Structure of the operations manual**
It provides an operations manual model structure for UAS operators to follow in order to present their operations manual in an appropriate manner.
- **A.4: Compliance matrix**
It provides a template for UAS operators on how to present the reference between the SORA-driven requirements and the operations manual.
- **A.5: How to document and present a flight area**
It contains guidance for UAS operators on how to create and include a flight area into the operations manual.

A.1 Key principles for completing the application documents for UAS operations to be conducted in the 'specific' category

How does an application generally work?

The operations manual serves as the basis for an operational authorisation for UAS operations to be conducted in the 'specific' category. When the competent authority issues the operational authorisation, it accepts the related operations manual.

General workflow

Before starting collecting information and describing procedures, the UAS operator should outline a preliminary operational concept (refer to Section S.4.1 of this AMC). This preliminary operational

concept ensures that the UAS operator can effectively explore all available options, and select the most suitable approach for its specific needs.

Key considerations for this initial plan include the following:

- the intended flight location(s);
- the maximum operational flight altitude and speed;
- the flight mode: either VLOS or BVLOS with or without AOs;
- the type of UAS to be used;
- environmental limitations (time of day, weather).

In the next step, the UAS operator assesses the risk for the operation and develops a high-level overview of the SORA requirements. For this, the UAS operator should apply the requirements of Section A.2 and follow each step of the SORA process.

When SORA phase 1 (see Figure A.1) is completed, it is considered best practice for a UAS operator to liaise with the competent authority before moving to the data collection and procedure description (refer to Section S.3.3 of this AMC) to share its preliminary operational information and initial risk assessment. The competent authority and the UAS operator evaluate the alignment of the risk assessment with the operational information and check the correct application of the SORA steps. The competent authority may provide feedback to the UAS operator on its expectations on how to achieve an operational authorisation considering the resulting SAIL.

Once the risk assessment (i.e. the outcome of SORA Phase 1) has been validated and the UAS operator has secured confirmation from the competent authority, the next step involves identifying the specific requirements that arise from the risk assessment (i.e. conduct SORA phase 2 and develop the evidence in support of compliance with the applicable OSOs, mitigations and containment). Following this identification, the UAS operator should then collect the relevant evidence and information, as well as describe the procedures that will be implemented. The UAS operator should ensure that all integrity and corresponding assurance requirements are met. These can be found in Annexes [B](#) to [E](#) to this AMC. It is recommended to use the operations manual structure provided in Chapter A.3 for this purpose.

The UAS operator should use the template provided in Chapter A.4 (Compliance matrix) once all procedures are described and evidence is collected. This is done by providing the corresponding reference to the integrity and/or assurance evidence for each requirement. This document serves as a checklist for the UAS operator to review before submitting an application. The competent authority may use this document as a reference to assist the review process.

The competent authority reviews the application in accordance with the requirements arising from the risk assessment and the respective SAIL. In this process, the implementation of all technical and operational requirements is checked based on the descriptions in the operations manual, or other associated documents as required. The competent authority has the option to request the UAS operator to revise the documents and resubmit them, or ask for additional supporting documentation.

For the UAS operator to address the additional requests effectively, the competent authority may also provide guidance on how the UAS operator can proceed to close any outstanding issues.

Figure A.1 graphically depicts the process described above and thus serves as an additional illustration of the general workflow.

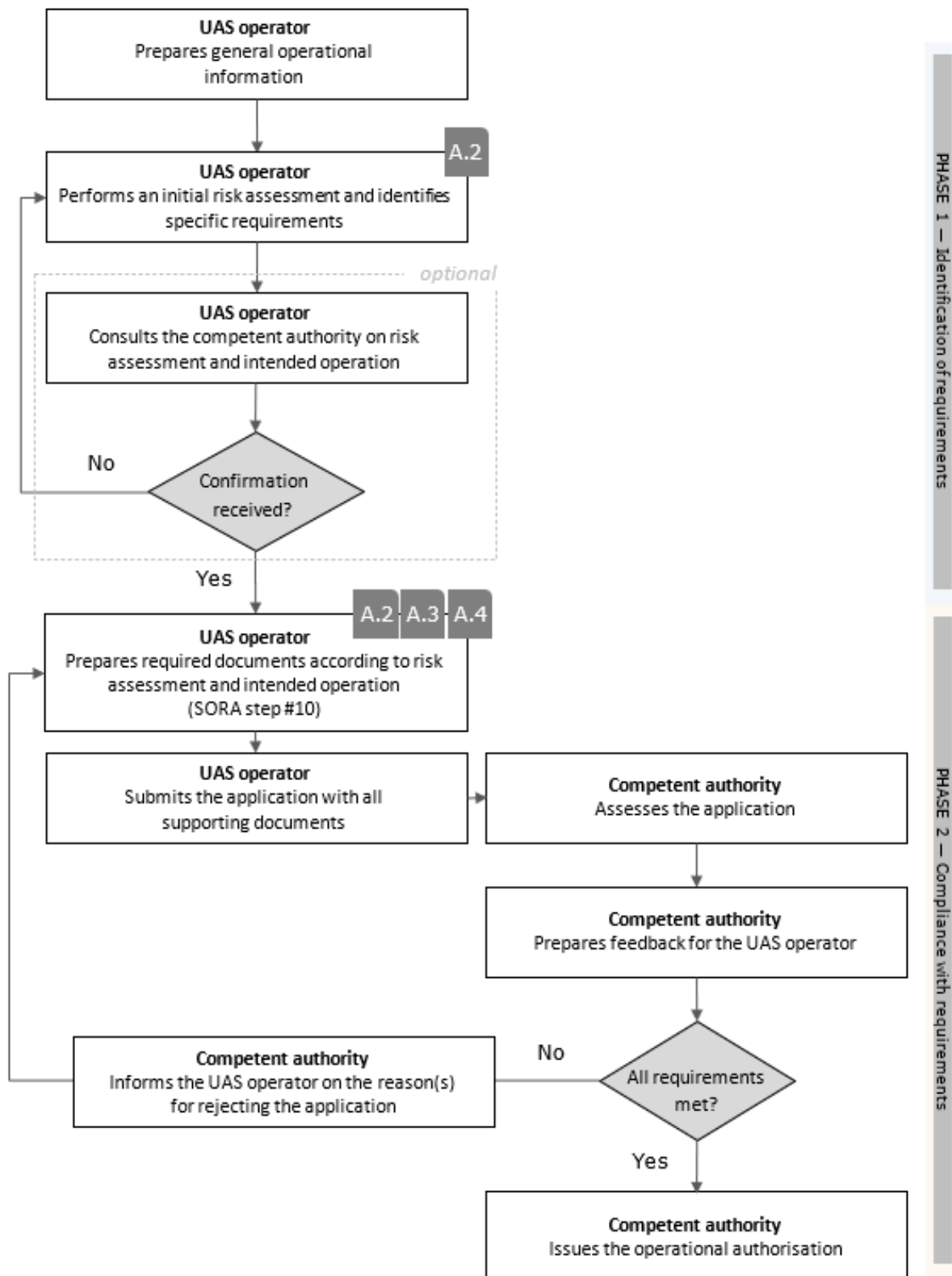


Figure A.1 — Recommended level of detail and use of supporting documents and references

The operations manual and its associated annexes should enable the UAS operator to describe how to conduct the operation safely for the benefit of its staff. It should include the identification of the

flight area, all normal, contingency and emergency procedures and additional information derived by the compliance with the required OSOs, mitigations and containment requirements.

Supporting documents serving as evidence for the compliance with the required OSOs, mitigations and containment requirements may be referenced in the operations manual and can be linked in the compliance matrix (see Section A4) and be included in a separate document. Evidence developed in support of requirements having a low level of robustness (related to the OSOs, based on the SAIL of the operation or to the level of mitigation and or to the containment chosen by the UAS operator) may be kept internal to the UAS operator's organisation. The same applies in case the level of robustness of the requirements is medium and the UAS operators decided to use AMC published by EASA. The competent authority may require those evidence during the oversight audit or anytime. In case the level of robustness of the requirements is high or it is medium and the UAS operators decided not to use AMC published by EASA, then the evidence should be provided with the application of the operational authorisation.

The competent authority may request further documents if considered necessary by the competent for the given operation.

Document set-up for additional flight areas, UAS or UAS operations

When a UAS operator seeks to expand its approved operations manual(s) to include a new flight area, a UAS or a UAS operation, the primary question is whether the underlying risk assessment covers these additions. If it does, the new information can be incorporated into existing parts (see Chapter A.3 of this Annex — Part A to T) of the operations manual(s). Otherwise, it is considered best practice to establish new parts for such information.

When dealing with complex UAS operations (e.g. multiple types of UAS operations and multiple UAS employed), the UAS operator may find it useful to use a different structure of the operations manual compared to that proposed by this Annex. In this case, it is recommended to discuss the proposed manual's structure with the competent authority to ensure it meets both national and industry standards.

Operation-specific details should typically be organised into separate parts for clarity during approval and ease of use. Conversely, general or related information can be consolidated into a common segment. An example would be adding an additional UAS with the same characteristic dimensions, but a different set of procedures. This could be added to existing Part B; for illustration purposes, see Figure A.2.

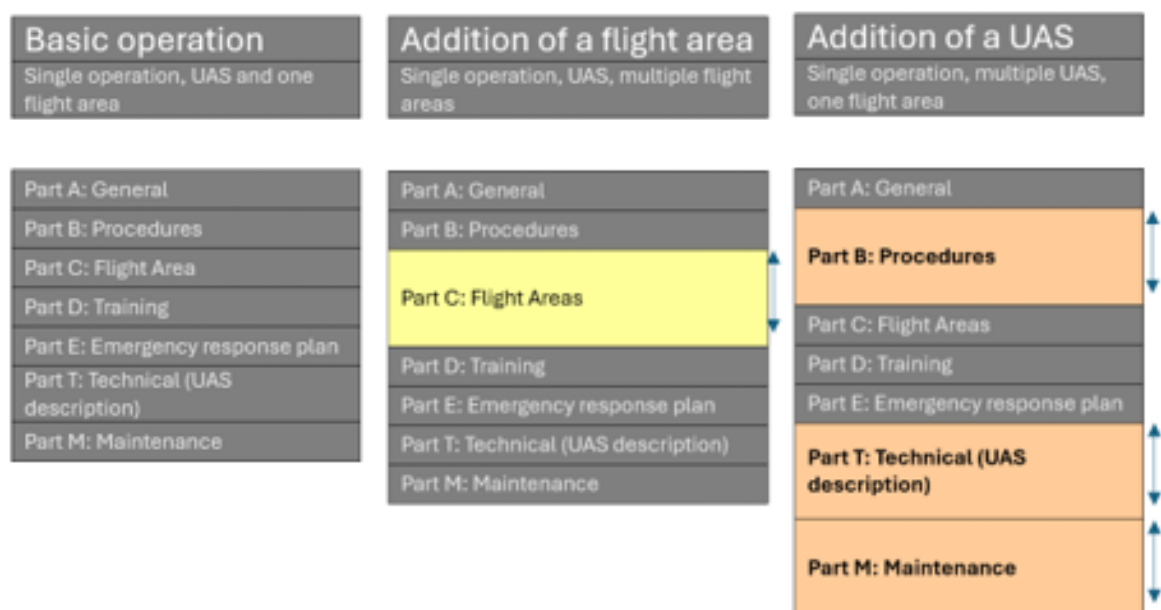


Figure A.2 — Common scenarios and how they may impact the operations manual

A.2 SORA risk assessment template

Introduction

This chapter serves as a guide to assist UAS operators in compiling all the necessary information for conducting a risk assessment. UAS operators should submit an application for an operational authorisation using the form provided in [AMC1 UAS.SPEC.030\(2\)](#). By providing this questionnaire-style template for documenting the risk assessment, UAS operators are encouraged to focus on the essential information required and to avoid unnecessary lengthy explanations about their operational procedures.

The ‘remarks’ section is optional and is designed for UAS operators to provide additional information when needed, helping to prevent misunderstandings. At this stage, no evidence is required as the requirements are determined by the risk analysis process.

Once the application form is completed, both the UAS operator and the competent authority will have all the necessary information to complete Phase 1 assessment (for reference, see Figure A.1). Note that for Phase 1 the fields 2.9 (OM references) and 2.10 (compliance evidence file reference) of the application form ([AMC1 UAS.SPEC.030\(2\)](#)) may not be filled in yet.

In situations involving the use of multiple UA or flight areas with varying ground or air risk classes, it is advisable to consult with the competent authority. This practice helps ensuring alignment with competent authority expectations and adherence to national standards. In certain cases, it may be possible to include multiple UA or flight areas into one form.

Evidence should not be included in the application form. Instead, it should be incorporated into the operations manual (Chapter A.3 ‘Structure of the operations manual’) and referenced in the CSP (Chapter A.4 ‘Compliance matrix’).

A.3 Structure of the operations manual

Introduction

The intention of this chapter is to provide a standardised framework for documenting essential information that relates to a specific operation. It serves only as an example structure for UAS

operators to create a comprehensive document that outlines the procedures and relevant details necessary for the safe and efficient execution of a UAS operation¹.

In the example structure, the operations manual is divided into logical subject parts, which in turn offer a structure as regards where to include specific topics that are crucial for creating a standardised manual for the safe operation of UAS.

While the structure is not inherently mandatory, the topics it contains should be incorporated into the operations manual as needed for the specific operation(s) to provide the relevant information and evidence required for the safe operation of UAS. It is advisable to adhere to the provided structure, as it aligns with the expectations and practices of most competent authorities. An example of an operations manual may be found on the EASA website².

In general, any information that does not have direct operational relevance to the UAS operator or its staff should be placed in the relevant annex to ensure the document remains concise and reader-friendly.

The main purpose of this structure is the following:

1. **Standardisation:** It ensures that all critical aspects of the UAS operation are documented consistently, following applicable industry standards and regulations, and best practices.
2. **Compliance:** It helps operators meet regulatory requirements by specifying the information and procedures needed to obtain necessary approvals and certification.
3. **Clarity:** It provides a clear and organised structure for conveying operational procedures, safety protocols and other essential information, thus reducing the risk of misunderstandings and errors.
4. **Safety:** It emphasises safety measures, emergency procedures and risk-mitigation strategies to enhance the overall safety during the operation.
5. **Efficiency:** It streamlines the process of creating an operations manual by providing predefined sections and guidelines, helping UAS operators save time and effort.
6. **Consistency:** It ensures that all UAS operators that are involved in the operation of the same UAS type follow the same documented procedures, promoting uniformity and reducing the potential for confusion.
7. **Reference:** It serves as a valuable reference document for UAS operators, remote crew members, competent authorities and other stakeholders involved in, or overseeing, the UAS operation.
8. **Documentation:** It aids in the systematic recording of operational details, making it easier to track changes, updates, and compliance with evolving regulatory requirements.

¹ An example of an operations manual and modules providing dedicated procedures may be found on the EASA website at <https://www.easa.europa.eu/en/domains/drones-air-mobility/operating-drone/specific-category-civil-drones/predefined-risk-assessment-pdra#group-easa-downloads>.

² <https://www.easa.europa.eu/en/domains/drones-air-mobility/operating-drone/specific-category-civil-drones#group-easa-downloads>

Recommended structure for the operations manual

Cover page

Document control

Other applicable documents

Purpose and scope of this document

List of contents

List of definitions and abbreviations

1 Part A — General Part

1.1 Opening statement

1.2 Security and privacy statement

1.3 Environmental statement

1.4 The operating organisation

1.4.1 Structure / organisation chart

1.4.2 Duties and responsibilities of the personnel

1.5 Change management

1.6 Retention periods

1.7 Document control

1.8 Requirements and qualifications for personnel

1.8.1 Remote pilot

1.8.2 Maintenance personnel

1.8.3 Ground staff

1.8.4 Training, examination and supervision personnel

1.9 Crew member is 'fit for the operation'

1.9.1 Preventive health care

1.9.2 Duty hours and rest periods

2 Procedures (Part B)

2.1 Multi-crew coordination

2.2 Flight planning

2.2.1 Use of up-to-date information

2.2.2 Geographical zones

2.3 External services and systems

2.3.1 Services

2.3.2 Systems

2.4 Procedures for obtaining information about and evaluating weather conditions

2.5 Procedures for responding to unexpected adverse weather conditions

-
- 2.6 Procedures for tactical mitigation performance requirements (TMPRs)
 - 2.7 Occurrence reporting
 - 2.7.1 What must be reported?
 - 2.7.2 Who must report?
 - 2.7.3 What must be observed after reporting?
 - 2.8 Procedures specifically for UAS 1
 - 2.8.1 Normal procedures
 - 2.8.2 Contingency procedures
 - 2.8.3 Emergency procedures
 - 2.9 Procedures specifically for UAS 2
 - 2.9.1 Normal procedures
 - 2.9.2 Contingency procedures
 - 2.9.3 Emergency procedures
 - 3 Part C — Flight areas
 - 3.1 General operational limitations
 - 3.1.1 Environmental conditions
 - 3.1.2 Technical operational limitations
 - 3.2 Flight area 1
 - 3.2.1 Description
 - 3.2.2 Calculation of the contingency volume (CV) / ground risk buffer (GRB)
 - 3.2.3 Specific procedures for flight area 1
 - 3.2.4 Emergency response plan (ERP) — Local information
 - 3.3 Flight area 2
 - 3.3.1 Description
 - 3.3.2 Calculation of the contingency volume (CV) / ground risk buffer (GRB)
 - 3.3.3 Specific procedures for flight area 2
 - 3.3.4 Emergency response plan (ERP) — Local information
 - 3.4 Flight area 3
 - 3.4.1 Description
 - 3.4.2 Calculation of the contingency volume (CV) / ground risk buffer (GRB)
 - 3.4.3 Specific procedures for flight area 3
 - 3.4.4 Emergency response plan (ERP) — Local information
 - 4 Part D — Training
 - 5 Part E — Emergency response plan (ERP)
 - 5.1 General

-
- 5.2 Creation of the ERP
 - 5.3 ERP template
 - 5.4 Preparation and briefing
 - 5.5 Reporting procedures and obligations after an emergency
 - 6 Part T — Technical part of the UAS
 - 6.1 UAS 1 [Model/Type]
 - 6.1.1 Description
 - 6.1.2 Image/graphic
 - 6.1.3 C3 link
 - 6.1.4 Parachute (M2)
 - 6.1.5 TMPRs
 - 6.1.6 Containment
 - 6.1.7 Human–machine interface (HMI)
 - 6.1.8 Payload
 - 6.1.9 Automatic protection of the flight envelope
 - 6.1.10 Designed and qualified to operate in adverse environmental conditions
 - 6.2 UAS 2 [Model/Type]
 - 6.2.1 Description
 - 6.2.2 Image/graphic
 - 6.2.3 C3 link
 - 6.2.4 Parachute (M2)
 - 6.2.5 TMPRs
 - 6.2.6 Containment
 - 6.2.7 Human–machine interface (HMI)
 - 6.2.8 Payload
 - 6.2.9 Automatic protection of the flight envelope
 - 6.2.10 Designed and qualified to operate in adverse environmental conditions
 - 7 Part M — Maintenance
 - 7.1 General
 - 7.2 Software updates
 - 7.3 Maintenance of UAS 1 [Model/Type]
 - 7.4 Maintenance of UAS 2 [Model/Type]
 - 8 Annex
 - 8.1 Evidence
 - 8.1.1 Organisational evidence

- 8.1.1.1 Organisational operating certificate
- 8.1.1.2 Maintenance programme / organisation certificate
- 8.1.2 Operational evidence
 - 8.1.2.1 Operational agreements (e.g. with ATC)
 - 8.1.2.2 M1
 - 8.1.2.3 Flight tests
 - 8.1.2.4 Performance of external services and systems
- 8.1.3 Technical evidence
 - 8.1.3.1 Design (DVR, TC)
 - 8.1.3.2 M2
 - 8.1.3.3 Manufacturer competence
- 8.2 Printed forms
 - 8.2.1 List of maintenance personnel
 - 8.2.2 List of personnel authorised to conduct pre-flight and post-flight inspections
 - 8.2.3 List of the training/experience level of personnel
 - 8.2.4 List of authorised remote pilots
 - 8.2.5 List of personnel trained in the emergency response plan (ERP)
 - 8.2.6 Operator flight logbook
 - 8.2.7 Technical logbook
- 8.3 Checklists
 - 8.3.1 ERP template
 - 8.3.2 Pre-flight inspection — Checklist
 - 8.3.3 Post-flight inspection — Checklist
- 8.4 Manuals
 - 8.4.1 Maintenance manual for UAS 1
 - 8.4.2 Maintenance manual for UAS 1

Reference table for the requirements specified in the annexes to AMC1 (SORA)

The following table offers a comprehensive overview of the suitable locations within the operations manual where the requirements specified in the annexes to AMC1 (SORA) can be sensibly incorporated.

OSOs ↓	Integrity (I) / Assurance (A)	Criterion	OM
OSO #01	I	—	Part A Part D
	A	—	Annex 8.1.1.1

OSO #02	I	—	Part T
	A	—	Annex 8.1.3.3
OSO #03	I	—	Part M Chapter 7.1 Annex 8.1.1.2
	A	#1	Part A Chapter 1.7 Annex 8.1.1.2
		#2	Part A Chapter 1.7 Annex 8.1.1.2
		#3	Part A Chapter 1.6 Part A Chapter 1.7 Annex 8.1.1.2
OSO #04	I	—	Part T
	A	—	Annex 8.1.3.1
OSO #05	I	—	Part T
	A	—	Annex 8.1.3.1
OSO #06	I	—	Part T Chapter 6.1.3
	A	—	Annex 8.1.3.1
OSO #07	I	—	Part B Chapter 2.8.1 Part D Annex 8.2.6
	A	#1	Part A Chapter 1.7
		#2	Part A Chapter 1.7
OSO #08	I	#1	Part B Part D Annex 8.3
		#2	Part B Part D
		#3	Part E
	A	—	Part B Part D Annex 8.1.2.3 Part E Annex 8.3.1
		—	
OSO #09	I	—	Part A Chapter 1.7
	A	—	Part D
OSO #13	I	—	Part B Chapter 2.3
	A	—	Part B Chapter 2.3 Annex 8.1.2.4
OSO #16	I	#1	Part B Chapter 2.1
		#2	Part D
	A	#1	Part B Chapter 2.1 Annex 8.1.2.3
		#2	Part D
		#3	Annex 8.1.2.4
OSO #17	I	—	Part A Chapter 1.9
	A	—	Part A Chapter 1.9
OSO #18	I	—	Part T
	A	—	Annex 8.1.3.1

OSO #19	I	—	Part B Chapter 2.8
	A	—	Annex 8.1.3.1
OSO #20	I	—	Part T Chapter 6.1.7
	A	—	Annex 8.1.3.1
OSO #23	I	—	Part B Chapter 2.4 Part C Chapter 3.1.1 Part D
	A	—	Part C Chapter 3.1 Part B Chapter 2.4 Annex 8.1.2.3 Part D
OSO #24	I	—	Part T
	A	—	Annex 8.1.3.1
M1	I	—	Part C Chapter 3.2.3.2
	A	—	Annex 8.1.2.2
M2	I	—	Part T
	A	—	Annex 8.1.3.2
ARC mitigation	I	—	Part C Chapter 3.2.3.3
	A	—	Annex 8.1.2.1
TMPRs	I	—	Part B Chapter 2.8.3.4 Part B Chapter 2.8.3.5 Part T Chapter 6.1.5
	A	—	Annex 8.1.3.1
Containment	I	—	Part T Chapter 6.1.6
	A	—	Annex 8.1.3.1
Payload	I	—	Part T Chapter 6.1.8
	A	—	Annex 8.1.3.1

A.4 Compliance matrix

Introduction

This chapter provides a template for UAS operators on how to present the reference between the SORA-driven requirements and the operations manual from Chapter A.3 of Annex A to this AMC to the competent authority.

For all the requirements that should be fulfilled in order to conduct a safe UAS operation, the UAS operator should put the specific reference into the compliance matrix table where it can be found.

This is not a list of evidence, but the reference where it can be found.

Example:

...		
Requirement	Level of robustness	Reference to documentation
OSO #08	☒ Low ☐ Medium ☐ High	Document name: <u>MyOperationsManual.pdf</u> Chapter or page number: <u>Chapter B, pp. 42–47</u> <u>Chapter Annex, p. 815</u>
...		

(The level of robustness in this case is SAIL dependent, and should be checked accordingly (e.g. 'low' for SAIL II).

Compliance matrix		
Requirement	Level of robustness	Reference to documentation
Ground risk mitigations		
M1(A) Strategic mitigations — Sheltering	☐ None ☐ Low ☐ Medium	Document name: _____ Chapter or page number: _____
M1(B) Strategic mitigations — Operational restrictions	☐ None ☐ Medium ☐ High	Document name: _____ Chapter or page number: _____
M1(C) Tactical mitigations — Ground observation	☐ None ☐ Low	Document name: _____ Chapter or page number: _____
M2 — Effects of UA impact dynamics are reduced	☐ None ☐ Medium ☐ High	Document name: _____ Chapter or page number: _____

Strategic air risk mitigations		
Air risk class (ARC) mitigation	☐ ARC-d (AEC 1 or 2) → ARC-c ☐ ARC-d (AEC 1 or 2) → ARC-b ☐ ARC-d (AEC 3) → ARC-c ☐ ARC-d (AEC 3) → ARC-b ☐ ARC-c (AEC 4) → ARC-b ☐ ARC-c (AEC 5) → ARC-b ☐ ARC-c (AEC 6,7,8) → ARC-b ☐ ARC-c (AEC 9) → ARC-b	Document name: _____ Chapter or page number: _____

Tactical mitigation performance requirements (TMPRs)		
TMPR level	☐ VLOS (deconfliction scheme)	Document name: _____

	☐ BVLOS ☐ No requirement (ARC-a) ☐ Low requirement (ARC-b) ☐ Medium requirement (ARC-c) ☐ High requirement (ARC-d)	Chapter or page number: _____
TMPR function	Detect	Document name: _____ Chapter or page number: _____
	Decide	Document name: _____ Chapter or page number: _____
	Command	Document name: _____ Chapter or page number: _____
	Execute	Document name: _____ Chapter or page number: _____
	Feedback loop	Document name: _____ Chapter or page number: _____
TMPR robustness	TMPR integrity and assurance objectives	Document name: _____ Chapter or page number: _____

Containment requirements		
Containment	☐ Low ☐ Medium ☐ High ☐ Tethered	Document name: _____ Chapter or page number: _____

Operational safety objectives (OSOs)		
OSO #01 Ensure that the UAS operator is a competent and/or proven organisation	☐ NR ☐ Low ☐ Medium ☐ High	Document name: _____ Chapter or page number: _____
OSO #02 UAS designed and produced by a competent and/or proven organisation	☐ NR ☐ Low ☐ Medium ☐ High	Document name: _____ Chapter or page number: _____
OSO #03	☐ Low	Document name: _____

Maintenance of the UAS	☐ Medium ☐ High	_____ Chapter or page number: _____
OSO #04 UAS components essential for its safe operation are designed to an Airworthiness Design Standard (ADS)	☐ NR ☐ Low ☐ Medium ☐ High	Document name: _____ Chapter or page number: _____
OSO #05 UAS is designed considering system safety and reliability	☐ NR ☐ Low ☐ Medium ☐ High	Document name: _____ Chapter or page number: _____
OSO #06 C3 link characteristics (e.g. performance spectrum use) are appropriate for the UAS operation	☐ NR ☐ Low ☐ Medium ☐ High	Document name: _____ Chapter or page number: _____
OSO #07 Conformity check of the UAS configuration	☐ Low ☐ Medium ☐ High	Document name: _____ Chapter or page number: _____
OSO #08 Operational procedures are defined, validated and adhered to	☐ Low ☐ Medium ☐ High	Document name: _____ Chapter or page number: _____
OSO #09 Remote crew trained and current	☐ Low ☐ Medium ☐ High	Document name: _____ Chapter or page number: _____
OSO #13 External services supporting UAS operations are adequate for the UAS operation	☐ Low ☐ Medium ☐ High	Document name: _____ Chapter or page number: _____
OSO #16 Multi-crew coordination	☐ Low ☐ Medium ☐ High	Document name: _____ Chapter or page number: _____
OSO #17 Remote crew is fit to operate	☐ Low ☐ Medium ☐ High	Document name: _____ Chapter or page number: _____
OSO #18 Automatic protection of the flight envelope from human errors	☐ NR ☐ Low ☐ Medium ☐ High	Document name: _____ Chapter or page number: _____
OSO #19 Safe recovery from human error	☐ NR ☐ Low ☐ Medium ☐ High	Document name: _____ Chapter or page number: _____

OSO #20 A human factors evaluation has been performed and the human-machine interface (HMI) has been found appropriate for the intended UAS operation	☐ NR ☐ Low ☐ Medium ☐ High	Document name: _____ Chapter or page number: _____
OSO #23 Environmental conditions for safe operations are defined and measurable	☐ Low ☐ Medium ☐ High	Document name: _____ Chapter or page number: _____
OSO #24 The UAS is designed and qualified to operate in adverse environmental conditions	☐ NR ☐ Medium ☐ High	Document name: _____ Chapter or page number: _____

Confirmation	
Have all safety requirements been described and met?	☐ Yes ☐ No
Place, date	Name and signature

A.5 How to document and present a flight area

Introduction

This chapter provides guidelines, typically located under Part C ‘Flight areas’ of the operations manual, on how to prepare and present a flight area. The goal is to present the proposed flight area in a way that is both straightforward and easy to understand. This is crucial not only for the competent authority reviewing this section, but especially for all staff that participate in the flight operation and consult the operations manual.

It is worth noting that this section is also relevant for operators that have the privilege to analyse, approve and document flight areas independently, such as those approved under a generic operational authorisation.

For better usability, Chapter A.5 is divided into two sections:

- **Section A.5.1** provides a comprehensive guide on creating a *.kml file, which is a file format for displaying information in a geographic context. It also specifies the basic necessities for the illustration and delves into the methods of depicting the flight area, as well as explaining the underlying reasons for these representations in the operations manual.
- **Section A.5.2** provides a sample computation for determining the minimum dimensions of the contingency volume and the ground risk buffer. These examples are intended solely as illustrative calculations. For a more in-depth analysis, one may also employ sophisticated flight-mechanics-based computations. These calculations can be incorporated into the operations manual annex. UAS operations covered by standard scenarios (STS) or predefined risk assessments (PDRA) should use at least the values defined in the STS or the PDRA.

While adhering to these guidelines, it is important to cite the source used for the calculations. If the UAS operator chooses to use alternative calculations, it is important to provide clear explanation and supporting documentation that outline the methodology and its safety assurances.

A.5.1 Presentation

The provided graphical representation of the flight area should contain as a minimum:

- an area: flight geography in transparent green colour;
- an area: contingency volume in transparent yellow colour;
- an area: ground risk buffer in transparent red colour;
- a position: remote pilots' position (for VLOS operations);
- a position: remote pilots' position and AO position (for BVLOS operations with AOs);
- a position: take-off / landing position (optional).

The UAS operator should provide the flight area to the competent authority when required. This should be in the format of a *.kml file or a similar format suitable for visualisation, accompanied by the operations manual or a referenced document that includes all pertinent flight area details. There are two methods for delineating the flight area: 'inside out' or 'reverse'. The choice between them largely depends on the constraining factor. For many applications, the 'inside out' method will provide the desired areas based on the specific flight geography.

However, there may be situations where it is preferable to utilise the maximum available ground risk buffer (e.g. controlled ground) and then determine the maximum possible flight geography from that. This is called 'reverse' computation of the flight area.

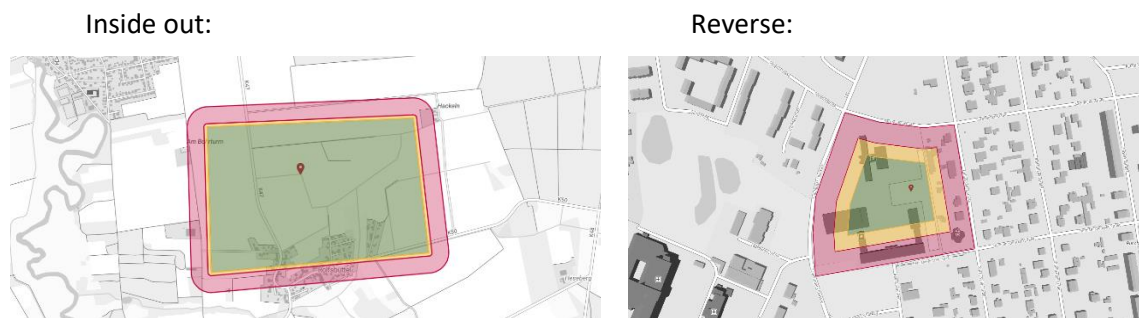


Figure 9 — 'Inside out' versus 'reverse' computation of the flight area

Areas within the flight geography that need to be excluded for any reason (e.g. higher ground risk) should be addressed in the same way as to surround them with a contingency volume and a ground risk buffer.

A screenshot of the flight area, accompanied by a concise description, all input values, and the calculations for contingency volume (CV) and ground risk buffer (GRB) should be documented. For instance, in Part C of the operations manual according to Chapter A.3.

The content should be presented in a manner that is easily comprehensible to all parties involved in the operation, enabling swift access to all pertinent data during routine operations. It is also crucial for the competent authority to understand the calculation process. If the derivation of the calculation or the overall rationale is unusually extensive, it is advisable to relocate the sections not directly pertinent to daily operations to the operations manual annex.

Example:

Detailed information for each flight area is typically located under Part C, following the recommended format outlined in Chapter A.3 ‘Structure of the operations manual’.

In a structured chapter layout, this may appear as follows:

3 Part C — Flight Areas

3.2 Flight area [project name]

Description

The flight area, along with its precise coordinates, is delineated in the accompanying *.kml file ‘[project name.kml]’.

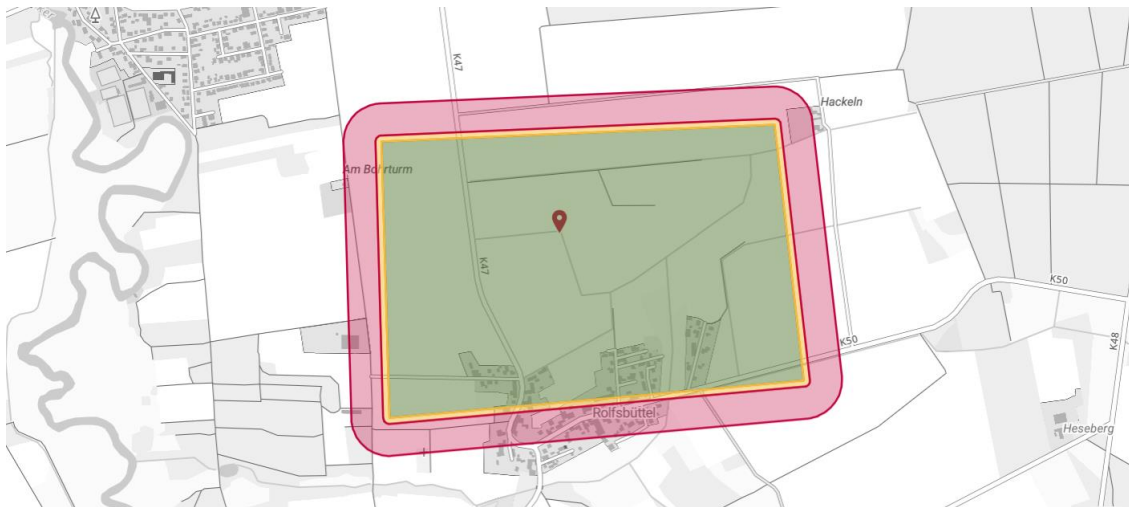


Figure 7 — Graphical representation of a flight area

The centre of the figure is located at **[N53.1234567 E11.1234567]**.

The remote pilot’s position is located at **[N53.1434567 E11.1434567]**.

General comment: *[The flight area is an area used for agricultural purposes, etc.]*

Special procedures/mitigations: *[CTR Clearance for airport XY is required, as per OM 2.2]*

Calculation of the contingency volume (CV) and the ground risk buffer (GRB)

The CV and the GRB were determined using the formulas described in paragraph A.5.2 of this annex.

UA characteristics:

- type: **[rotary wing without parachute]**;
- altitude measurement: **[barometric]**;
- maximum speed in operation V_0 : **[10,0 m/s]**;
- maximum permissible wind speed V_{Wind} : **[3,0 m/s]**;
- characteristic dimension CD: **[1,50 m]**;
- maximum pitch angle Θ_{max} : **[45°]**.

The following parameters were used:

-
- height of the flight geography H_{FG} : **[100,0 m]**;
 - calculation method: **[from inside]**;
 - manoeuvre on entering into the contingency volume (horizontal): **[stopping]**;
 - manoeuvre on entering the contingency volume (vertical): **[kinetic into potential]**;
 - manoeuvre on entering the ground risk buffer: **[power off]**.

Assumptions:

- GNSS accuracy S_{GNSS} : **[0,5 m]**;
- position holding error S_{Pos} : **[3,0 m]**;
- map error S_K : **[1,0 m]**;
- reaction time t_R : **[1,0 s]**;
- altitude measurement error H_{AM} : **[$H_{Baro} = 1,0$ m]**;
- additional distance (horizontal) S_{Add} : **[0,0 m]**;
- additional distance (vertical) H_{Add} : **[0,0 m]**.

Reasons for deviations from the standard values:

- S_{GNSS} (**[0,5 m]** instead of **[3,0 m]**): **[The UA is equipped with ...]**;
- ...;
- H_{CM} (**[3,0 m]** instead of **[5,1 m]**): **[The assumption based on ...]**.

Results

Flight altitude:

- Altitude of the flight geography H_{FG} : **[100,0 m]**.

Contingency volume:

- Horizontal S_{CV} : **[34,5 m]**;
- Vertical H_{CV} : **[113,1 m]**.

Ground risk buffer:

- Horizontal S_{GRB} : **[113,8 m]**.

Adjacent ground area:

- Horizontal S_{AA} : **[5000 m]**.

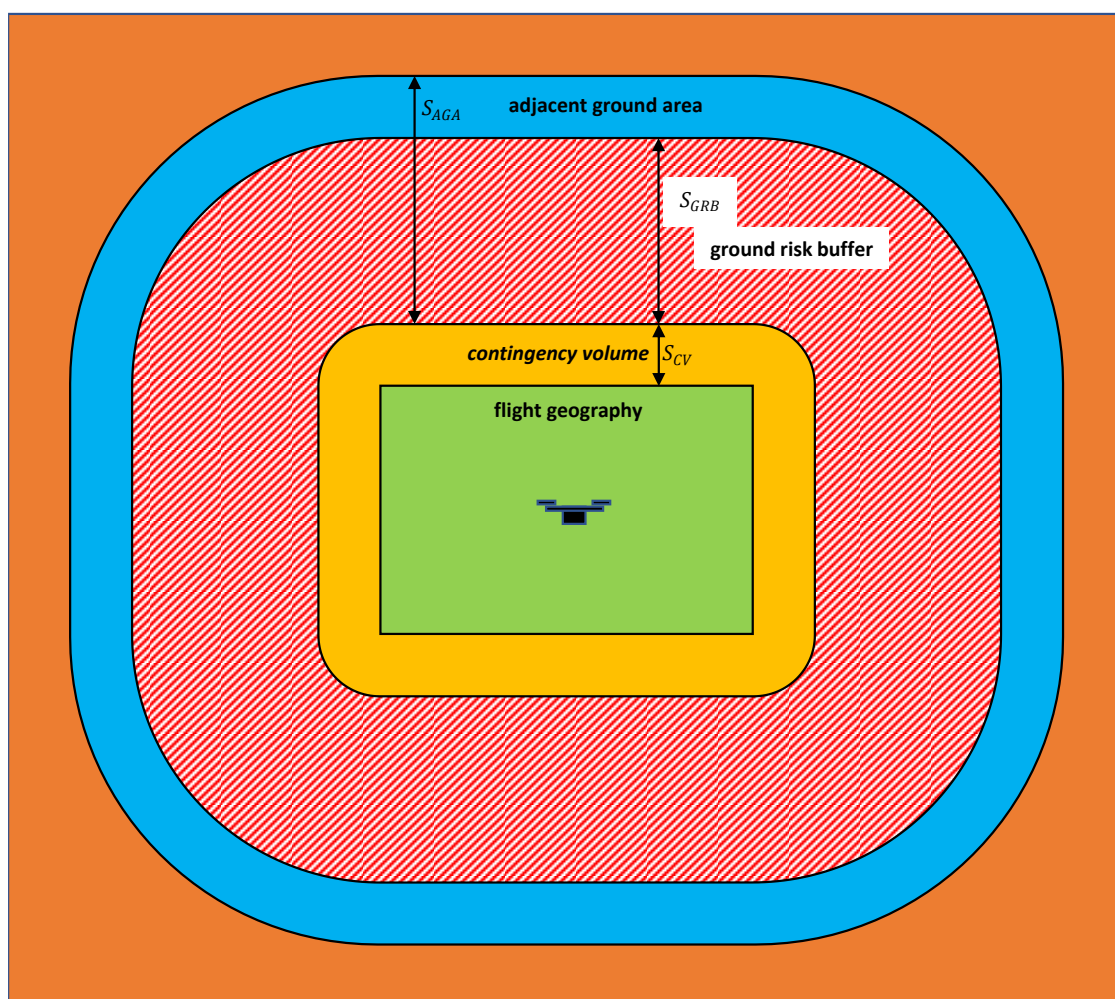
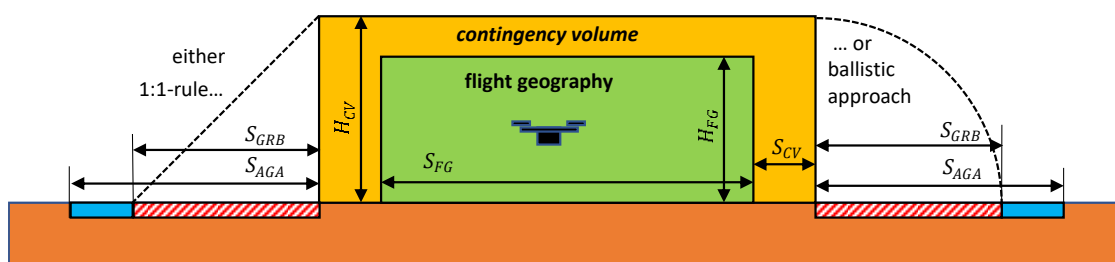


Figure 8 — Schematic representation of the flight geography, the contingency volume and the ground risk buffer

A.5.2 Calculations used in the example case in the paragraph above

A.5.2.1 Information required for the calculations

V_0 , m/s	Maximum operational speed that is flown. This corresponds to the information in point 3.6 in the operational authorisation application form provided in AMC1 UAS.SPEC.030(2) .

	<i>Note: A speed below 3 m/s for multirotor and $1.25 \cdot V_{\text{Stall, clean}}$ for fixed-wing aircraft is not considered realistic.</i>
CD, m	For the 'maximum UA characteristic dimension (CD)', please refer to definition I.141 'UA characteristic dimensions' in Annex I to this AMC. Propellers and rotors are part of the geometry, whereby their most unfavourable position is considered. This corresponds to the information in point 3.4 of the operational authorisation application form provided in AMC1 UAS.SPEC.030(2) .
V_{Wind} , m/s	Maximum wind speed specified in the operations manual up to which the UA may be operated.
FG	Flight geography
CV	Contingency volume
GRB	Ground risk buffer

A.5.2.2 Computation of the flight geography

Variant 1 ('inside out')

The size of the flight geography usually results from the operator's desired flight geography. The contingency volume and the ground risk buffer just add up to this area.

Variant 2 ('reverse')

Determination of the maximum flight geography available, e.g. when operating over a controlled ground area.

In this example (controlled ground), the ground projection of the flight geography, the contingency volume and the ground risk buffer should be completely contained in the controlled ground area. A calculation in reverse is recommended.

The outer limit of the ground risk buffer corresponds to the topology of the controlled ground area.

In the first step, the horizontal extent (width) of the ground risk buffer is subtracted from the topology of the controlled ground area. This gives the boundary between the contingency volume and the ground risk buffer.

In the second step, the horizontal extent (width) of the contingency volume is then subtracted from this limit. This results in the maximum possible expansion of the flight geography as the remaining area.

Notes on the realistic definition of particularly small flight geographies:

Flight geography (FG) horizontal	
Width of the flight geography: S_{FG}	$S_{\text{FG}} \geq 3 \text{ CD}$
Flight geography (FG) vertical	
Height of the flight geography: H_{FG}	$H_{\text{FG}} \geq 3 \text{ CD}$
<i>Note: Values smaller than $H_{\text{FG}} = 3 \text{ CD}$ and $S_{\text{FG}} = 3 \text{ CD}$ are considered unrealistic, also for automated waypoint flights.</i>	

A.5.2.3 Computation of the contingency volume

Notes on the realistic dimensioning of the contingency volume. Assumptions can be substituted with real values if evidence is available:

Contingency volume horizontal	
GNSS accuracy: S_{GNSS}	$S_{\text{GNSS}} = 3 \text{ m}$
Position holding error: S_{Pos}	$S_{\text{Pos}} = 3 \text{ m}$
Map error: S_K	$S_K = 1 \text{ m}$
Reaction distance: S_R	<u>Manual initiation of measures</u> Reaction time: $t_R = 1 \text{ s}$, with V_0 results in $S_R = V_0 t_R$ <i>Note: t_R may also be smaller in fully automatic systems (e.g. geofence).</i>
Contingency manoeuvres: S_{CM}	<u>Multicopter — stopping</u> Based on $S_{\text{CM}} = \frac{1}{2} a t_R^2 + V_0 t_R$ follows for a thrust to weight ratio of at least 2 $\text{thrust} \geq 2 m g$ and a maximum pitch angle of less than 45 degrees $\theta_{\text{max}} \leq 45^\circ$ The minimum distance for stopping to hovering mode is: $S_{\text{CM}} = \frac{1}{2} \frac{V_0^2}{g \tan(\theta)}$ <u>Fixed-wing aircraft –180° turn:</u> Assumption: roll angle $\Phi_{\text{max}} \leq 30^\circ$ The radius for the turn is: $S_{\text{CM}} = \frac{V_0^2}{g \tan(\Phi)}$
Alternative contingency manoeuvre parachute: S_{CM}	Flight terminated with parachute triggered when leaving the FG t_P = Time to open the parachute $S_{\text{CM}} = V_0 t_P$
Horizontal extension of the contingency volume: S_{CV}	$S_{\text{CV}} = S_{\text{GPS}} + S_{\text{Pos}} + S_K + S_R + S_{\text{CM}}$
Examples	

Example: multirotors $V_0 = 10 \frac{\text{m}}{\text{s}}, \theta = 45^\circ, [\tan(45^\circ) = 1]$	$S_{CV} = 3 \text{ m} + 3 \text{ m} + 1 \text{ m} + 10 \text{ m} + \frac{1}{2} \cdot \frac{\left(10 \frac{\text{m}}{\text{s}}\right)^2}{9,81 \frac{\text{m}}{\text{s}^2} \cdot 1} = 22,1 \text{ m}$
Example: fixed-wing aircraft $V_0 = 30 \frac{\text{m}}{\text{s}}, \Phi = 30^\circ$	$S_{CV} = 3 \text{ m} + 3 \text{ m} + 1 \text{ m} + 30 \text{ m} + \frac{\left(30 \frac{\text{m}}{\text{s}}\right)^2}{9,81 \frac{\text{m}}{\text{s}^2} \cdot \tan(30^\circ)}$ $= 195,9 \text{ m}$
Contingency volume vertical	
Altitude measurement error: H_{AM}	$H_{AM} = H_{\text{Baro}} = 1 \text{ m}$ for barometric altitude measurement or $H_{AM} = H_{\text{GNSS}} = 4 \text{ m}$ for GNSS-based altitude measurement. <i>Note: When operating close to large buildings or between buildings in narrow streets, the altitude information provided by GNSS may not be reliable.</i>
Reaction distance: H_R	<u>Manual initiation of measures</u> Reaction time: $t_R = 1 \text{ s}$, with 45° pitch angle $H_R = V_0 \cdot 0,7 \cdot t_R$ <i>Note: t_R may also be smaller in fully automatic systems (e.g. geofence). If external services are used for command and control, their system latency should be taken into consideration.</i>
Contingency manoeuvres: H_{CM}	<u>For multirotor</u> The forward kinetic energy is completely converted into potential energy. This results in $H_{CM} = \frac{1}{2} \frac{V_0^2}{g}$ <u>For fixed-wing aircraft</u> Exit the FG upwards with a 45° pitch angle, then fly on a constant circular path with V_0 and radius r until level flight is achieved. With $r = \frac{V_0^2}{g}$ results in the contingency manoeuvre height being approximately $H_{CM} = \frac{V_0^2}{g} \cdot 0,3$
Alternate contingency manoeuvre parachute: H_{CM}	Flight terminated with parachute triggered when leaving the FG

	Exit FG with 45° pitch angle t_P = Time to open the parachute $H_{CM} = V_0 \cdot t_P \cdot 0,7$
Contingency volume: H_{CV}	$H_{CV} = H_{FG} + H_{AM} + H_R + H_{CM}$
Examples	
Height of the flight geography	$H_{FG} = 100 \text{ m}$
Example: multirotor: $V_0 = 10 \frac{\text{m}}{\text{s}}$	$H_{CV} = 100 \text{ m} + 1 \text{ m} + 7 \text{ m} + \frac{1}{2} \cdot \frac{\left(10 \frac{\text{m}}{\text{s}}\right)^2}{9,81 \frac{\text{m}}{\text{s}^2}} = 113,1 \text{ m}$
Example: fixed-wing a/c: $V_0 = 30 \frac{\text{m}}{\text{s}}$	$H_{CV} = 100 \text{ m} + 1 \text{ m} + 21 \text{ m} + \frac{\left(30 \frac{\text{m}}{\text{s}}\right)^2}{9,81 \frac{\text{m}}{\text{s}^2}} \cdot 0,3 = 149,52 \text{ m}$

A.5.2.4 Computation of the ground risk buffer

Ground risk buffer horizontal	
Simplified approach: 1:1 rule: S_{GRB}	$S_{GRB} = H_{CV} + \frac{1}{2} CD$
Ballistic approach: S_{GRB} Note: Only permitted for rotorcraft and multirotors!	$S_{GRB} = V_0 \sqrt{\frac{2 H_{CV}}{g}} + \frac{1}{2} CD$
Termination with parachute: S_{GRB} <i>Note: Values below $V_{Wind} = 3 \frac{\text{m}}{\text{s}}$ are not considered realistic for this computation.</i>	t_P = Time to open the parachute From the rate of descent with the parachute open (V_z) and the maximum permissible wind speed for operation (V_{Wind}) results in $S_{GRB} = V_0 t_P + V_{Wind} \frac{H_{CV}}{V_z}$
Termination with fixed-wing aircraft: S_{GRB}	<u>Power is switched off:</u> A glide ratio of $E = \frac{1}{\varepsilon} = \frac{C_L}{C_D}$ results in $S_{GRB} = E H_{CV}$ <u>Power is switched off and the flight control surfaces are permanently set in a way that no gliding is possible:</u> The simplified approach can be chosen (1:1 rule).
Examples	

Simplified approach: Multirotor: $V_0 = 10 \frac{\text{m}}{\text{s}}$, $CD = 1,5 \text{ m}$, $H_{CV} = 113,1 \text{ m}$	$S_{GRB} = 113,1 \text{ m} + \frac{1}{2} \cdot 1,5 \text{ m} = 113,85 \text{ m}$
Ballistic approach: Multirotor: $V_0 = 10 \frac{\text{m}}{\text{s}}$, $CD = 1,5 \text{ m}$, $H_{CV} = 113,1 \text{ m}$	$S_{GRB} = 10 \frac{\text{m}}{\text{s}} \sqrt{\frac{2 \cdot 113,1 \text{ m}}{9,81 \frac{\text{m}}{\text{s}^2}}} + \frac{1}{2} \cdot 1,5 \text{ m} = 48,77 \text{ m}$
Fixed-wing aircraft if only power is switched off: $V_0 = 30 \frac{\text{m}}{\text{s}}$, $CD = 3 \text{ m}$, $H_{CV} = 149,52 \text{ m}$, $E=20$	$S_{GRB} = 149,52 \text{ m} \cdot 20 = 2990,4 \text{ m}$
Fixed-wing aircraft if power is switched off and flight control surfaces set so that no gliding is possible: $V_0 = 30 \frac{\text{m}}{\text{s}}$, $CD = 3 \text{ m}$, $H_{CV} = 149,52 \text{ m}$	$S_{GRB} = 149,52 \text{ m} + \frac{1}{2} \cdot 3 \text{ m} = 151,02 \text{ m}$
GRB vertical	— not applicable —

A.5.2.5 Examples of computation of maximum distance(s) for VLOS / BVLOS with AOs

When determining the operating range for VLOS or BVLOS with AO operations, care should be taken to ensure that the remote pilot can actually operate the UAS within their visual range or within the visual range of the AOs.

To check whether the described UAS operation is in VLOS or in BVLOS, the following calculations may be used.

VLOS / BVLOS with AO limit	In VLOS or in BVLOS with AOs the air risk is mitigated by having the UA in sight of the remote pilot or of the AO. The maximum possible distance between the remote pilot or the AO and the UA results from the smaller value of ALOS and DLOS . Anything beyond that is considered BVLOS .
ALOS	Attitude line of sight (ALOS) The ALOS defines the maximum distance up to which a remote pilot can detect the position and orientation of the UA. Up to this limit, the remote pilot is able to control the flight path of the UA and is able to determine the attitude and position of the UA. This distance was determined in practical tests.
DLOS	Detection line of sight (DLOS) The DLOS defines the distance up to which the UA could theoretically fly while at the same time other aircraft in the same direction can be visually detected, and sufficient time is available for an avoidance manoeuvre. The ground visibility is crucial for this.
GV	Ground visibility (GV) The GV depends on the operational area and the meteorological conditions, and should be determined at the respective time of operation. The procedure for

	precisely determining GV should be described in a section of the OM related to procedures (e.g. Section 2.4 of the OM structure provided in A.3 of this annex). The use of landmarks or the use of a transmissometer is possible. The maximum ground visibility to be assumed is 5 km, analogue to the visibility according to the VFR rules in airspace G¹.

ALOS limit	<u>For rotorcraft and multirotors:</u> $ALOS_{\max} = 327 \cdot CD + 20 \text{ m}$ <u>For fixed-wing aircraft:</u> $ALOS_{\max} = 490 \cdot CD + 30 \text{ m}$
DLOS limit	$DLOS_{\max} = 0,3 \cdot GV$ The GV depends on the actual ground visibility at site and time of operation. However, the following always applies: $GV_{\max} = 5 \text{ km}$

If the largest possible distance between the remote pilot's location and the outer side of the CV (boundary between CV and GRB) is greater than the VLOS distance, no VLOS operation may take place. UAS operations should then take place in BVLOS.

A.5.2.6 Examples for maximum VLOS distances

The following table is valid for a ground visibility of 5 km or more.

Characteristic dimension (CD)	Maximum VLOS distance	
	Rotary wing	Fixed wing
1 m	347 m	520 m
2 m	674 m	1 010 m
3 m	1 000 m	1 500 m
3,5 m	1 164,5 m	1 500 m
4 m	1 328 m	1 500 m
4,53 m	1 500 m	1 500 m
> 4,53 m	1 500 m	1 500 m

¹ As any larger GV value is not deemed possible to extend the bare eye DLOS beyond the 1.5 km, provided that sufficient time for avoidance is still available.

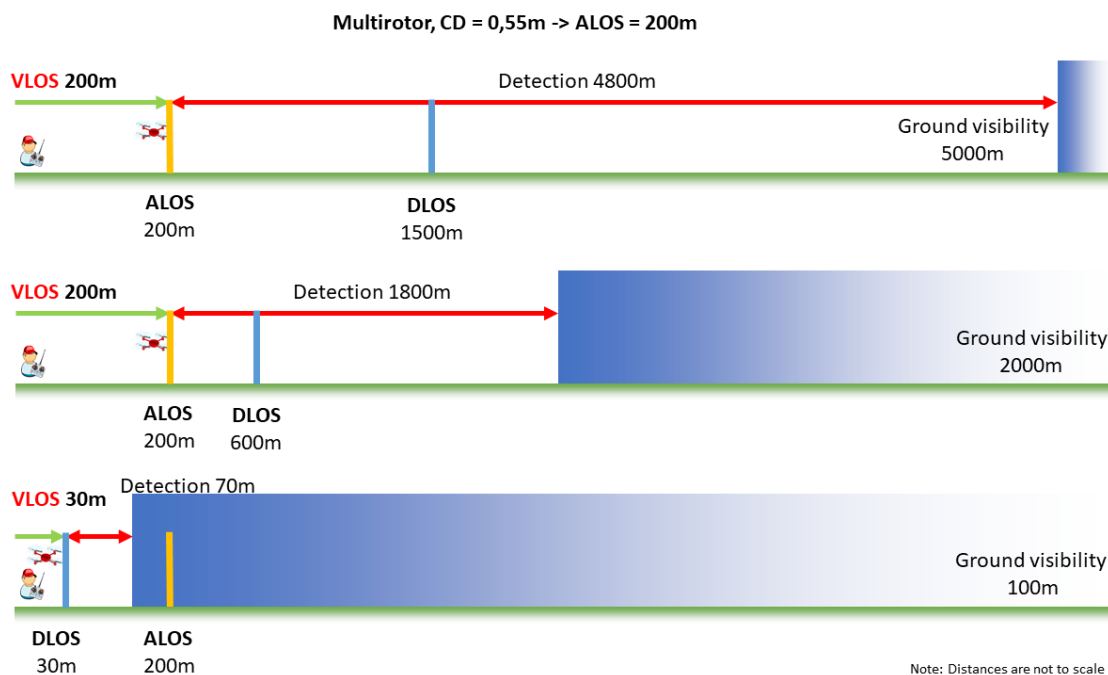


Figure 9 — Multirotor VLOS range

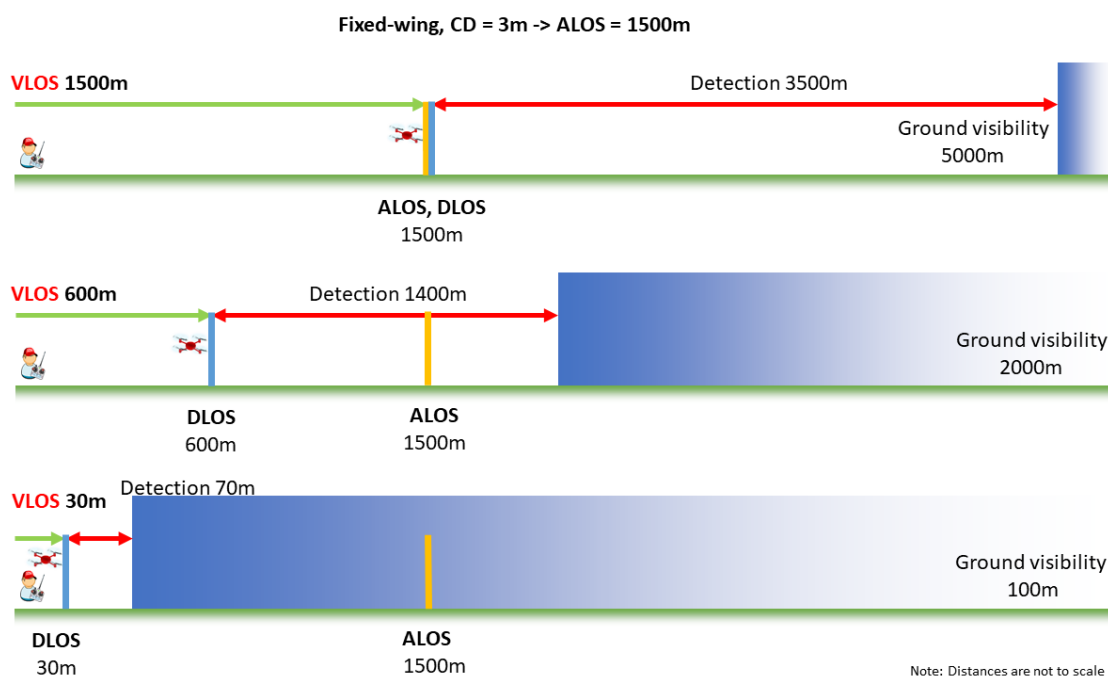


Figure 10 — Fixed-wing VLOS range

Annex B to AMC1 Article 11

ED Decision 2025/018/R

INTEGRITY AND ASSURANCE LEVELS FOR THE MITGATIONS USED TO REDUCE THE INTRINSIC GROUND RISK CLASS (iGRC)

B.1 How to use Annex B

The following table provides the basic principles to consider when using the SORA Annex B.

#	Principle description	Additional information
#1	Annex B provides the assessment criteria for the integrity (i.e. safety gain) and assurance (i.e. method of proof) of the applicant's proposed mitigations. The proposed mitigations are intended to reduce the iGRC associated with a given operation.	The identification and implementation of mitigations is the responsibility of the applicant.
#2	A proposed mitigation should have a positive effect on reducing the ground risk associated with defined operational limitations. In the case where a mitigation is available but does not reduce the ground risk, its level of integrity should be considered equivalent to 'None'.	
#3	To achieve a given level of integrity/assurance, when more than one criterion exists for that level of integrity/assurance, all applicable criteria need to be met, unless specified otherwise.	If a criterion for a mitigation is not applicable, it can be ignored (e.g. passive mitigations do not require training or activation).
#4	Annex B intentionally uses non-prescriptive terms (e.g. suitable, reasonably practicable) to provide flexibility to both applicants and competent authorities. This does not constrain the applicant in proposing mitigations, nor the competent authority in evaluating what is needed on a case-by-case basis.	
#5	Annex B in its entirety also applies to single-person organisations.	
#6	Annex B mitigations are applied to the operational volume and ground risk buffer. Annex B mitigations may be applied to the adjacent ground area.	Details of mitigation application to adjacent ground area can be found in Annex F Edition 2.5 ¹ .
#7	All bullet points within all tables in this Annex are meant to be fulfilled unless followed by 'or'.	
#8	The GRC cannot be lowered to a value less than the equivalent for controlled ground area.	
#9	Any criterion labelled 'technical design' will most likely require the support of the UAS or component designer for providing statements of compliance and, if applicable, gathering the required evidence.	
#10	The applicant may claim more points of GRC reduction than indicated in Table 11 (Table 5 in this AMC (SORA Main Body)) when the appropriate orders of magnitude reduction of the risk to uninvolved people can be demonstrated. Any of these claims should be fulfilled to 'high' robustness level.	

Table B.1— Basic principles

¹ http://jarus-rpas.org/wp-content/uploads/2024/06/SORA-v2.5-Annex-F-Release.JAR_doc_29pdf.pdf

B.2 M1(A) — Strategic mitigations — Sheltering

The M1(A) mitigation is linked to the fact that people spend on average a very small amount of time outdoors unprotected by a structure. Therefore, operators that use sufficiently small UAS can expect to have a large percentage of the population sheltered from an impact. This assumption may also apply to larger UAS; in these cases, the sheltering effectiveness should be demonstrated.

Time-based arguments such as ‘I fly at night and there are less people outdoors in my iGRC footprint’ do not belong to M1(A) low robustness. At medium robustness, time-based arguments are included. Sheltering at low robustness is to be understood as a generally applicable mitigation given by the characteristics of the environment being flown, with no operational restrictions added.

To prevent double-counting time-based restrictions, M1(A) medium robustness mitigation cannot be combined with any M1(B) mitigations. However, M1(A) low robustness has no operational restrictions and can be combined with M1(B) mitigations.

		LEVEL of INTEGRITY	
		Low	Medium
M1(A) — Sheltering	Criterion #1 (Evaluation of people at risk)	If the UAS operator claims a reduction due to a sheltered operational environment, the UAS operator: a) flies over operational environments generally consisting of structures providing shelter (e.g. buildings); b) it is reasonable to expect that on average a vast majority of the uninvolved people will be located under a structure ¹ . This mitigation cannot be claimed when flying over outdoor assemblies of people or over areas with no shelter.	Same as low. In addition, the UAS operator restricts operating times (e.g. during night-time) and demonstrates that an even greater proportion of uninvolved people are sheltered.
	Comments	¹ The consideration of this mitigation may vary based on local conditions. A metastudy of time-activity pattern studies shows that people generally spend at most 10% of their time outside. Diffey, B. (2010) . An overview analysis of the time peoplespend outdoors. <i>The British journal of dermatology</i> . 164. 848-54. 10.1111/j.1365-2133.2010.10165.x. The intention is to estimate the proportion of people outside on average and not at a specific time of day or year. There will be times when at specific locations temporarily there are more people exposed, but it should be sufficient to expect that on average the proportion of people exposed outside is below 10%. However, assemblies of people should be avoided. UAS operators and/or competent authorities may consider adapting this ratio based on other evidence. Please, see GM2 UAS.SPEC.030(2) to identify whether the application of M1 triggers the need to apply for an operational authorisation with precise or generic locations.	
	Criterion #2 (Evaluation of penetration hazard)	The UAS operator uses a UA that is not expected to penetrate structures and fatally injure people under the shelter ² .	

	<i>Comments</i> ² Guidance on how to evaluate the sheltering effect can be found in the following: — ASSURE UAS Ground Collision Severity Evaluation A4 report section '4.12. Structural Standards for Sheltering (KU)', pp. 103–111, or — MITRE presentation given during the UAS Technical Analysis and Applications Center (TAAC) conference in 2016 titled 'UAS EXCOM Science and Research Panel (SARP) 2016 TAAC Update' - PR 16-3979. <i>In general, it can be expected that UAS with a take-off mass of less than 25 kg are not able to penetrate into buildings except in cases where the UAS speed or building materials are unusual (e.g. tents, glass roofs, etc).</i>

Table B.2 — Level of integrity assessment criteria for M1(A) mitigation

		LEVEL of ASSURANCE	
		Low	Medium
M1(A) — Sheltering	Criterion #1 (Evaluation of people at risk)	The UAS operator declares that the operation is in an environment that has structures ¹ providing shelter where the vast majority of people are generally expected to be, and the UA does not fly over large outdoor assemblies of people.	Same as 'low'. In addition, the UAS operator has time-based restrictions in place and evidence to support that a higher proportion of people are sheltered. Medium robustness M1(A) mitigation cannot be combined with M1(B) mitigations.
	<i>Comments</i>	¹ For example, a city or town consists generally of structures providing shelter. While it may also include areas that are not sheltered, the mitigation is expected to be provided in most of such cases.	
	Criterion #2 (Evaluation of penetration hazard)	The applicant declares that the UA used has a take-off mass of less than 25 kg. OR For UA with a take-off mass higher than 25 kg ¹ , the UAS operator has supporting evidence that the required level of integrity is achieved. This is typically done by means of testing, analysis, simulation, inspection, design review or through operational experience.	
	<i>Comments</i>	¹ UA technical information needed for the evaluation may require support from the UAS designer.	

Table B.3 — Level of assurance criteria for M1(A) mitigation

B.3 M1(B) — Strategic mitigations — Operational restrictions

M1(B) mitigations are intended to reduce the number of people at risk on the ground independently of sheltering. These mitigations are applied before the flight.

Improvements in the data included in the static data population density maps are not part of M1(B) mitigations and should be already used in the intrinsic ground risk assessment at Step #2. Use of best available data is encouraged to be used already for the iGRC determination.

A competent authority may on a case-by-case basis accept pure time exposure arguments for ground risk reduction but should consider how this affects the cumulative risk. M1(B) mitigations are combinations of limitations on time and location of the operation to reduce the number of people at risk at a set time and location.

		LEVEL of INTEGRITY	
		Medium	High
M1(B) — Operational restrictions	Criterion #1 (Evaluation of people at risk)	The UAS operator provides space-time-based restrictions (e.g. flying over a market square when it is not crowded) to substantiate that the actual density of people during the operation is lower than that in Step #2. This can be done by means of: a) an analysis or appraisal of the characteristics of the location ¹ and the time ² of operation; AND/OR b) the use of temporal density data (e.g. data from a supplemental data service provider) relevant for the proposed area; this can incorporate real-time or historical data.	
	Comments	¹ The characteristics of the location should be understood as land use that relates to the presence of people, e.g. industrial area, urban park or shopping centres. ² Time should be understood as time of day or day of the week that would influence the presence of people, e.g. weekend for industrial plants, night-time, time after opening hours of shops.	
	Criterion #2 (Impact on population at risk)	The population at risk is lowered by at least 1 iGRC population band ³ (~90 %) using one or more methods described in the level of integrity for criterion #1 above.	The population at risk is lowered by at least 2 iGRC population bands ³ (~99 %) using one or more methods described in the level of integrity for criterion #1 above.
	Comments	³ The iGRC population band is described in '4.2.3 Step #2' of the SORA Main Body.	

Table B.4 — Level of integrity assessment criteria for M1(B) mitigation

		LEVEL of ASSURANCE	
		Medium	High
M1(B) — Operational restrictions	Criterion #1 (Evaluation of people at risk)	All mapping products, data sources and processes used to claim lowering the density of population at risk are accepted by the competent authority.	
	Comments	N/A	
	Criterion #2 (Impact on population at risk)	The UAS operator has supporting evidence that the required level of integrity is achieved. This is typically done by means of analyses, surveys or through operational experience.	The claimed level of integrity is validated by the competent authority of the Member State or by an entity that is designated by the competent authority against a standard considered adequate by the competent authority and/or in accordance with means of compliance acceptable to that authority.
	Comments	Quantitative and qualitative mitigations can in combination meet the target reductions of populations at risk set in 'medium' and 'high' integrity levels.	

Table B.5 — Level of assurance criteria for M1(b) mitigation

B.4 M1(C) — Tactical mitigations — Ground observation

The M1(C) mitigation is a tactical mitigation where the remote crew or the system can observe most of the overflown area(s), allowing the detection of uninvolved people in the operational area and manoeuvring the UA so that the number of uninvolved people overflown during the operation is significantly reduced¹.

		LEVEL of INTEGRITY
		Low
M1(C) — Ground observation	Criterion #1 (Procedures)	To achieve a reduction of the number of people at risk: a) the remote crew members observe the vast majority of the overflown areas during the operation and identify area(s) of lower risk on the ground (e.g. presence of uninvolved people and obstacles); b) the remote pilot reduces the number of people at risk by adjusting the flight path while the operation is in progress (e.g. flying away from the area with a higher risk on the ground or overflying only the identified area(s) of lower risk on the ground). ¹
	Comments	¹ The iGRC population band is described in Chapter 4.2.3 Step #2 of this AMC (SORA Main Body).
	Criterion #2 (Technical means)	If the mitigation is achieved through the use of technical means ¹ (e.g. camera(s) mounted on the UA or visual observers on the ground with radios/phones), these should provide data of reliable quality allowing the reliable detection of uninvolved people on the ground.
	Comments	¹ Criterion #2 may require support from the UAS or the component designer to gather the required evidence.

Table B. 6 - Level of integrity assessment criteria for M1(C) mitigation

		LEVEL of ASSURANCE
		Low
M1(C) — Ground observation	Criterion #1 (Procedures)	The operational procedures for the mitigation are documented. The UAS operator declares that the required level of integrity has been achieved.
	Comments	N/A
	Criterion #2 (Technical means)	Competent authorities may allow the use of technical means ¹ for ground observation with assurance criteria acceptable to them.
	Comments	¹ Criterion #2 may require support from the UAS or the component designer to gather the required evidence.

Table B. 7— Level of assurance assessment criteria for M1(C) mitigation

B.5 M2 Effects of UA impact dynamics are reduced

M2 mitigations are intended to reduce the effect of ground impact once the control of the operation is lost. This is done by either reducing the probability of lethality of a UA impact (i.e. energy, impulse, transfer of energy dynamics, etc.) and/or by reducing the size of the expected critical area (see Table B.8 below). Examples include but are not limited to parachutes, autorotation, frangibility, stalling the aircraft to slow the descent and increase the impact angle. UAS designers should demonstrate the required total amount of reduction (see integrity criteria) in either or for both factors.

¹The size of the area where the remote crew is required to have ground observation should cover at least the projection on ground of the VLOS distance defined in Section A.5.2.5.

The base assumption in the SORA for UAS impact lethality before mitigation M2 is applied is that most impacts are lethal¹. Based on the characteristic dimensions of a UA, the related critical areas are displayed in Table B.8 below. Depending on whether the mitigation is passive, manually activated or automatically activated, UAS designers should provide correspondingly adequate evidence and procedures for a given level of robustness. The reduction of the inherent critical area of a UA by way of analysis should be conducted already in Step #2 of the SORA and is not part of mitigation M2.

Critical area calculations are defined in Annex F Edition 2.5² Chapter 1.8³. The table provided in Section S.4.2 of this AMC (SORA Main Body) assumes the following critical areas for each characteristic dimension.

Maximum characteristic dimension (m)	1	3	8	20	40
Critical area (m ²)	6.5	65	650	6 500	65 000

Table B.8 — Critical areas associated with the maximum characteristic dimension (non-mitigated)

UAS designers that claim a mitigation by reducing the critical area shall use the values above as the baseline for comparison to show the appropriate mitigation.

If a UAS operator or a UAS designer has used the modifications according to Annex F Edition 2.5⁴⁵ in Step #2, or has used the automatic critical area assessment tool available on the EASA website⁴, to show a corrected critical area for its UAS and matched the corrected critical area to a column in Table B.8, then this table value is used as the baseline against which the mitigation is assessed.

If a UAS operator or a UAS designer has used the modifications according to Annex F Edition 2.5⁴⁵ in Step #2 to show both a corrected critical area and a matching population density, then this custom critical area value is used as the baseline against which the mitigation is assessed, and the custom population density value should be used as a limitation in the UAS operation.

¹ Most UA impacts are assumed to be lethal in the SORA ground risk model except:

- impacts during slide of UA with characteristic dimension less or equal to 1 metre;
- any impacts during slide of UA with total kinetic energy below 290 joules.

See Annex F Edition 2.5 (http://jarus-rpas.org/wp-content/uploads/2024/06/SORA-v2.5-Annex-F-Release.JAR_doc_29pdf.pdf) for more details on calculation.

² http://jarus-rpas.org/wp-content/uploads/2024/06/SORA-v2.5-Annex-F-Release.JAR_doc_29pdf.pdf

³ Additional guidelines on the assessment of the critical area may be found at <https://www.easa.europa.eu/en/downloads/139781/en>.

⁴ <https://www.easa.europa.eu/en/domains/drones-air-mobility/operating-drone/critical-area-assessment-tool-caat>

		LEVEL of INTEGRITY	
		Medium ¹	High
M2 — Effects of UA impact dynamics are reduced	Criterion #1 (Technical design)	(a) The effects of impact dynamics and immediate post-impact hazards ² , the critical area or the combination of these are reduced such that the risk to population is reduced by an approximate 1 order of magnitude (90 %) ³ . (b) When applicable, in case of malfunctions, failures or a combination of these that could lead to a crash, the UAS contains all the elements required for the activation of the mitigation ⁴ . (c) When applicable, any failure or malfunction of the proposed mitigation itself (e.g. inadvertent activation) does not adversely affect the safety of the operation.	Same as 'medium'. In addition: (a) When applicable, the activation of the mitigation is automated ^{4,5,6} . (b) The effects of impact dynamics and immediate post-impact hazards ² , the critical area or the combination of these are reduced such that the risk to the population is reduced by an approximate 2 orders of magnitude (99 %) ³ .
	Comments	¹ MoC to Light-UAS.2512 ¹ is an acceptable means to comply with the 'medium' level of robustness for M2. Moreover, it provides additional explanation of the M2 criteria. ² Examples of immediate post-impact hazards include fires and release of high-energy debris. ³ Latest research on UAS impacts estimates injuries using the Abbreviated Injury Scale (AIS) developed for automotive impact tests and test dummies. An impact that has a 30 % chance of causing injury of AIS level 3 injury or greater is estimated to have a 10 % probability of death. Note that the SORA methodology only considers fatalities. It does not provide guidance on the injury levels / thresholds beyond which an injury should be considered as a fatality. Further guidance on how to evaluate impact severity measurement may be found for example in Ranges of Injury Risk Associated with Impact from Unmanned Aircraft Systems DOI: 10.1007/s10439-017-1921-6, ASSURE UAS reports A14 and A4 on UAS Ground Collision Severity Evaluation. ⁴ For 'medium' robustness, the UAS designer is expected to address only probable malfunctions, failures and their combinations. No single failure should lead simultaneously to a loss of control of the operation and a reduction of the effectiveness of the M2 mitigation. ⁵ An automated activation may be required when reaction time is critical or when the operator cannot determine the need for activation. ⁶ The UAS designer may nevertheless implement an additional manual activation function.	
	Criterion #2 (Procedures)	Any piece of equipment used to reduce the effect of the UA impact dynamics is installed, operated and maintained in accordance with the UAS/mitigation designer instructions.	
	Comments	N/A	

¹ <https://www.easa.europa.eu/en/document-library/product-certification-consultations/means-compliance-mitigation-means-m2-ref-amc>

		LEVEL of INTEGRITY	
		Medium ¹	High
	Criterion #3 (Training)	When the use of the mitigation requires action from the remote crew, then the UAS operator should provide appropriate training to the remote crew. The UAS operator should ensure that the personnel (internal or external) responsible for the installation and maintenance of the mitigations are qualified for the task.	
	Comments	N/A	

Table B.1 — Level of integrity assessment criteria for M2 mitigation

		LEVEL of ASSURANCE	
		Medium	High
M2 — Effects of UA impact dynamics are reduced	Criterion #1 (Technical design)	The UAS designer has supporting evidence to claim that the required level of integrity and reliability is achieved. This is typically done by means of testing, analysis, simulation¹, inspection, design review or through operational experience. A UAS with a C0 or C1 class mark or with an MTOM lower or equal to 900 g and a maximum speed of 19 m/s fulfils the assurance criterion 1. The UAS designer may provide a statement of compliance with MoC to Light-UAS.25122 by providing the supporting evidence defined in it.	The UAS operator should use a UAS for which EASA has verified the claimed integrity through a design verification report (DVR) issued following an application from the UAS designer.
	Comments	¹ When simulation is used, the validity of the targeted environment used in the simulation needs to be justified. ² https://www.easa.europa.eu/en/document-library/product-certification-consultations/means-compliance-mitigation-means-m2-ref-amc	
	Criterion #2 (Procedures)	(a) Procedures are validated against standards that are considered adequate by the competent authority of the Member State and/or in accordance with means of compliance acceptable to that authority. (b) The adequacy of the operator's procedures is justified through: (i) dedicated flight tests; or (ii) simulation, provided that the representativeness of the simulation means is proven for the intended purpose with positive results; (iii) any other means acceptable to the competent authority of the MS. (c) The UAS/mitigation designer provides the instructions necessary for the correct operation of the mitigations.	(a) the DVR covers the operating instructions of the mitigations; (b) the competent authority of the Member State or an entity that is designated by the competent authority verifies that the procedures developed by the UAS operator are acceptable.

	Comments	UAS operators may directly use the procedures provided by the UAS/mitigation designer and rely on the adequacy verification performed by them. AMC2 UAS.SPEC.030(3)(e) 'Operational procedures for medium and high levels of robustness' is considered an acceptable means of compliance.	
	Criterion #3 (Training)	(a) Training syllabus is available. (b) The UAS operator provides theoretical and practical training for the remote crew. (c) Personnel responsible for installation and maintenance of the mitigations have completed relevant training.	Same as 'medium'. In addition, the competent authority of the Member State or an entity that is designated by the competent authority: (a) validates the training syllabus; (b) verifies the remote crew competencies.
	Comments	N/A	

Table B.10 — Level of assurance assessment criteria for M2 mitigation

Annex C to AMC1 to Article 11

ED Decision 2023/012/R

STRATEGIC MITIGATION — COLLISION RISK ASSESSMENT

C.1 Introduction — air risk strategic mitigations

The target audience for Annex C is the UAS operator who wishes to demonstrate to the competent authority that the risk of a mid-air collision in the operational volume is acceptably safe, and to obtain, with concurrence from the ANSP, approval to operate in the particular airspace.

More particularly, this Annex C covers the process of how the UAS operator justifies lowering the initial assessment of the ARC.

The air risk model provides a holistic means to assess the risk of an encounter with manned aircraft. This provides guidance to both the UAS operator and the competent authority on determining whether an operation can be conducted in a safe manner. The model does not provide answers to all the air risk challenges, and should not be used as a checklist. This guidance provides the UAS operator with suitable mitigation means and thereby reduces the air risk to an acceptable level. This guidance does not contain prescriptive requirements, but rather a set of objectives at various levels of robustness.

C.2 Principles

The SORA is only used to establish an initial ARC for an operational volume when the competent authority has not already established one. The initial ARC is a generalised qualitative classification of the rate at which a UAS would encounter a manned aircraft in the operational volume. A residual ARC is the classification after mitigations are applied. The UAS operational volume may have collision risk levels that differ from the generalised initial ARC level. If this is assumed to be the case, this Annex provides a process to help the UAS operator and the competent authority work to lower the initial ARC through the application of strategic mitigations.

C.3 Air risk scope and assumptions

The scope of this air risk assessment is designed to help the UAS operator and the competent authority in determining the risk of a collision with manned aircraft which are operated under the 'specific' category. The scope of the air risk assessment does not include:

- (a) the probability of UAS on UAS encounters; or
- (b) risks due to wake turbulence, adverse weather, controlled flight into terrain, return-to-course functions, a lost link, or an automatic response.

C.3.1 SORA qualitative vs quantitative approach

This air risk assessment is qualitative in nature. Where possible, this assessment will use quantitative data to back up and support the qualitative assumptions. The SORA approach in general provides a balance between qualitative and quantitative approaches, as well as between known prescriptive and non-traditional methodologies.

C.3.2 SORA U-space assumptions

The SORA has used U-space mitigations to a limited extent, because U-space is in the early stages of development. When U-space provides adequate mitigations to limit the risk of UAS encounters with manned aircraft, a UAS operator can apply for, and obtain credit for these mitigations, whether they are tactical or strategic.

C.3.3 SORA flight rules assumptions

Today, UAS flight operations under the ‘specific’ category cannot fully comply with the IFR and VFR rules as written. Although IFR infrastructures and mitigations are designed for manned aircraft operations (e.g. minimal safe altitudes, equipage requirements, operational restrictions, etc.), it may be possible for a UAS to comply with the IFR requirements. UAS operating at very low levels (e.g. operational volume’s ceiling below 150m (~500 ft) AGL) may technically comply with the IFR requirements, but the IFR infrastructure was not designed with that airspace in mind; therefore, mitigations for this airspace would be derived, and would be highly impractical and inefficient. When operating BVLOS, a UAS cannot comply with VFR¹.

Given the above, for the purposes of this risk assessment, it is assumed that the competent authority will address these shortcomings. All aircraft must adhere to specific flight rules to mitigate the collision risk, in accordance with Regulation (EU) No 923/2012² (the standardised European rules of the air (SERA) Regulation). The implementation of procedures and guidelines appropriate to the airspace structure reduces the collision risk for all aircraft. For instance, there are equipment requirements established for the airspace requested and requirements associated with day-night operations, pilot training, airworthiness, lighting requirements, altimetry requirements, airspace restrictions, altitude restrictions, etc. These rules must still be addressed by the competent authority.

The Member State is responsible for defining the airspace structures in accordance with Regulation (EU) 2017/373; in addition, as required in [Article 15](#) of the UAS Regulation, the Member State will define the geographical zones for UAS operators. The Member State, when defining the airspace structure, considers the traffic type and complexity and defines the airspace classes and services being provided in accordance with the SERA. This information, which can be published either in the aeronautical information publication (AIP) or any other aeronautical publication, can be used by the UAS operator to identify the initial air risk. The SORA air risk model is a tool to assess the risks associated with UAS operations in a particular volume of airspace, and a method to determine whether those risks are within acceptable safety limits.

C.3.4 Regulatory requirements, safety requirements, and waivers

The SERA Regulation requires all aircraft, manned and UAS, to ‘remain well clear from and avoid collisions with’ other manned aircraft. The UAS is unable to ‘see and avoid’, therefore, it must employ an alternate means of compliance to meet the intent of ‘see and avoid’, which will have to be defined in terms of safety and performance for the UAS operation. When the risk of an encounter with manned aircraft is extremely low (i.e. in atypical/segregated airspace), an alternate means of compliance may not be required. For example, in areas where the manned airspace density is so low, (e.g. in the case of low-level operations in remote parts of Alaska or northern Sweden), the airspace safety threshold could be met with no additional mitigation. UAS operators need to understand that although the airspace may be technically safe to fly in from an air collision risk standpoint, it does not fulfil point SERA.3201 of the SERA Regulation, or the ICAO Annex 2, Section 3.2 ‘See and Avoid’ requirements.

¹ A UAS operating under VLOS may be able to comply with VFR.

² Commission Regulation (EU) No 923/2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation and amending Implementing Regulation (EU) No 1035/2011 and Regulations (EC) No 1265/2007, (EC) No 1794/2006, (EC) No 730/2006, (EC) No 1033/2006 and (EU) No 255/2010, OJ L 281, 13.10.2012, p.1.

To operate a UAS in manned airspace, two requirements must be met:

- (a) A safety requirement that ensures that the operation is safe to conduct in the operational volume; and
- (b) A requirement for compliance with point SERA.3201 of the SERA Regulation to ‘see and avoid’.

These requirements must be addressed to the competent authority through either:

- (1) demonstration of compliance with both requirements;
- (2) demonstration of an alternate means of compliance with the requirements; or
- (3) a waiver of the requirement(s) by the competent authority.

The SORA provides a means to assess whether the air risks associated with UAS operations is within acceptable limits.

C.3.5 SORA assumptions on threat aircraft

This air risk assessment does not consider the ability of the threat aircraft to remain well clear from or to avoid collisions with the UAS in any part of the safety assessment.

C.3.6 SORA assumptions on people-carrying UAS

This air risk model does not consider the notion of UAS carrying people, or urban mobility operations. The model and the assessment criteria are limited to the risk of an encounter with manned aircraft, i.e. an aircraft piloted by a human on board.

C.3.7 SORA assumptions on UAS lethality

This air risk assessment assumes that a mid-air collision between a UAS and manned aircraft is catastrophic. Frangibility is not considered.

C.3.8 SORA assertion on tactical mitigations

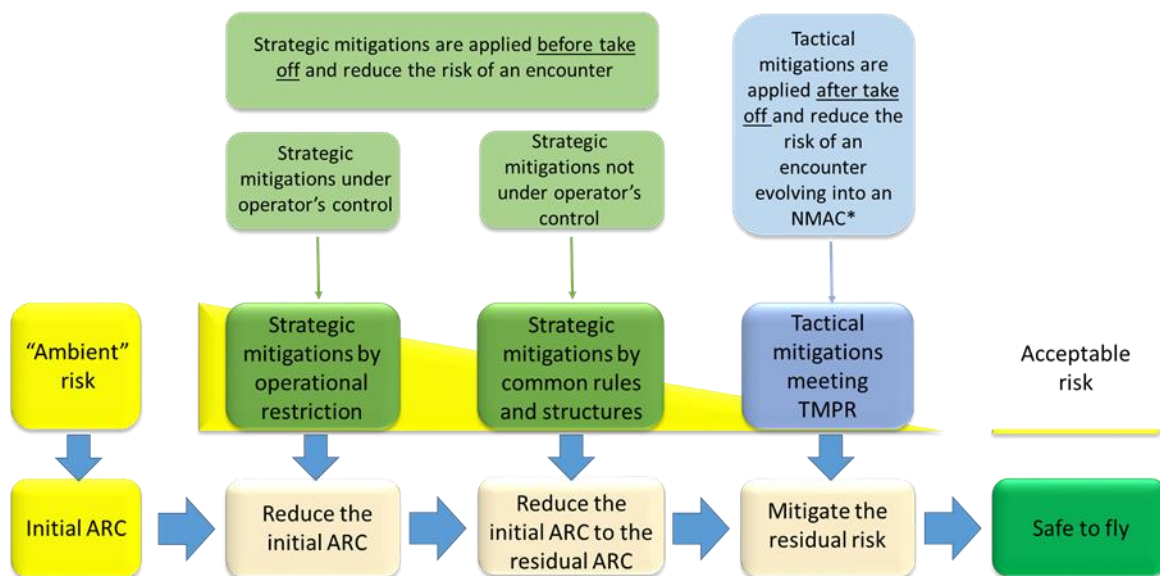
The SORA model makes no distinction between separation provision and collision avoidance but treats them as one dependent system performing a continuous function, whose goals and objectives change over time. This continuum starts with an encounter and progresses to a near mid-air collision objective as the pilot and/or the detect and avoid system of the UA negotiate(s) the encounter. The use of the term ‘tactical mitigation’ should therefore not be confused with the provisioning of (tactical) separation services referred to in ICAO Doc 9854.

C.4 General air-SORA mitigation overview

SORA classification of mitigations

The SORA classifies mitigations to suit the operational needs of a UAS in the ‘specific’ class. These mitigations are classified as:

- (a) strategic mitigations by the application of operational restrictions;
- (b) strategic mitigations by the application of common structures and rules; and
- (c) tactical mitigations.



* NMAC: near mid-air collision

Figure C.5 — SORA air conflict mitigation process

C.5 Air risk strategic mitigation

Strategic mitigation consists of procedures and operational restrictions intended to reduce the UAS encounter rates or the time of exposure, prior to take-off.

Strategic mitigations are further divided into:

- mitigations by operational restrictions which are mitigations that are controlled¹ by the UAS operator; and
- mitigations by common structures² and rules which are mitigations which cannot be controlled by the UAS operator.

C.5.1 Strategic mitigation by operational restrictions

Operational restrictions are controlled by the UAS operator and are intended to mitigate the risk of a collision prior to take-off. This section provides details on operational restrictions, and examples of how these can be applied to UAS operations.

Operational restrictions are the primary means that a UAS operator can apply to reduce the risk of collision using strategic mitigation(s). The most common mitigations by operational restriction are:

- mitigation(s) that bound the geographical volume in which the UAS operates (e.g. certain boundaries or airspace volumes); and
- mitigation(s) that bound the operational time frame (e.g. restricted to certain times of day, such as flying only at night).

¹ The usage of the word 'controlled' means that the UAS operator is not reliant on the cooperation of other airspace users to implement an effective operational restriction mitigation strategy.

² This usage of the word 'structure' means air structure, airways, traffic procedures and the like.

In addition to the above, another approach to limit exposure to risk is to limit the exposure time. This is called ‘mitigation by exposure’. Mitigation by exposure simply limits the time of exposure to the operational risk.

Mitigations that limit the flight time or the exposure time to risk may be more difficult to apply. With this said, there is some precedence for this mitigation, which has (in some cases) been accepted by the competent authority. Therefore, even though it is considered to be difficult, this mitigation strategy may be considered.

One example is the minimum equipment list (MEL) system, which allows, in certain situations, a commercial airline to fly for three to ten days with an inoperative traffic collision avoidance system (TCAS). The safety argument is that three days is a very short exposure time compared with the total life-time risk exposure of the aircraft. This short time of elevated risk exposure is justified to allow the aircraft to return to a location where proper equipment maintenance can take place. While appreciating that this may be a difficult argument for the UAS operation to make, the UAS operator is still free to pursue this line of reasoning for a reduction in the risk of collision by applying a time of exposure argument.

C.5.1.1. Example of operational restriction by geographical boundary

The UAS operator intends to fly in a Class B airport airspace. The Class B airspace, as a whole, has a very high encounter rate. However, the UAS operator wishes to operate at a very low altitude and at the very outer reaches of the Class B airspace where manned aircraft do not routinely fly. The UAS operator draws up a new operational volume at the outer edge of the class B airspace and demonstrates that operations within the new Class B volume have very low encounter rates.

The UAS operator may approach this scenario by requesting the competent authority to more precisely define the airport environment from the SORA perspective. The UAS operator then considers the newly defined airport environment, and provides an operational restriction that allows the UAS operation to safely remain inside the class B airspace, but outside the newly defined SORA airport environment.

C.5.1.2 Example of operational restriction by time limitations

The UAS operator wishes to fly in a Class B airport airspace. The Class B airspace, as a whole, has a very high encounter rate. However, the UAS operator wishes to operate at a time of day when manned aircraft do not routinely fly. The UAS operator then restricts the time schedule of the UAS operation and demonstrates that the new time (e.g. 03:00 / 3 AM and still within Class B) has very low encounter rates and is safe for operation.

C.5.1.3 Example of operational restriction by time of exposure

The UAS operator wishes to cut the corner of a Class B airspace for flight efficiency. The UAS operator demonstrates that even though the Class B airspace has a high encounter rate, the UAS is only exposed to that higher rate for a very short amount of time as it transitions the corner.

C.5.2 Strategic mitigation by common structures¹ and rules

¹ This usage of the word ‘structure’ means air structure, airways, traffic procedures and the like.

Strategic mitigation by common structures and rules requires all aircraft within a certain class of airspace to follow the same structures and rules; these structures and rules work to lower the risk of collision within the airspace. In accordance with the SERA Regulation, all aircraft in that airspace must participate, and only the competent authorities have the authority to set requirements for those aircraft, while the ANSP and ATCO provide instructions. The UAS operator does not have control¹ over the existence or level of participation of the airspace structure or the application of the flight rules. Therefore, strategic mitigation by common structures and rules is applied by the competent authorities. These should be made available to the UAS operator through the geographical zones, defined in accordance with [Article 15](#) of the UAS Regulation.

For example, imagine the situation if individual drivers could create their own driving rules to cover their direction, lanes, boundaries and speed. If the driving rules were different from one driver to another, no safety benefit would be gained, even though they were all following rules (their own), and total chaos would ensue. However, if all drivers were compelled to follow the same set of rules, then the traffic flow would be orderly, with increased safety for all drivers. This is why a UAS operator cannot propose a mitigation schema requiring participation from other airspace users that differs from that required by the competent authority.

Most strategic mitigations by common structures and rules will take the form of:

- (a) common flight rules; and
- (b) common airspace structures.

Strategic mitigations by common flight rules is accomplished by setting a common set of rules which all airspace users must comply with. These rules reduce air conflicts and/or make conflict resolution easier. Examples of common flight rules that reduce the collision risk include right of way rules, implicit and explicit coordination schemes, conspicuity requirements, cooperative identification system, etc.

Strategic mitigation by using a common airspace structure is accomplished by controlling the airspace infrastructure through physical characteristics, procedures, and techniques that reduce conflicts or make conflict resolution easier. Examples of common flight airspace structures which reduce the risk of collision are airways, departure and approach procedures, airflow management, etc.

In the future, as U-space structures and rules become more readily defined and adopted, they will provide a source for the strategic mitigation of UAS operations by common structures and rules that UAS operators could more easily apply.

C.5.2.1 Example of mitigation by common flight rules

The UAS operator intends to fly in a volume of airspace in which the competent authority requires all UAS to be equipped with an electronic cooperative system² and anti-collision lighting. The rules further require the UAS operator to file a flight plan with the designated ANSP/U-space service providers, and check for potential hazards along the whole flight route. The operator complies with these requirements and installs anti-collision lights and a Mode-S Transponder. The

¹ The usage of the words 'does not control' means that the UAS operator does not have control over the implementation of aviation structures and rules and is reliant on the competent authority to implement structures and rules.

² The installation of an electronic cooperative system would make the UAS a cooperative aircraft in accordance with FAA Interim Operational Approval Guidance 08-01, 'Unmanned Aircraft Systems Operations in the U.S. National Airspace System,' Federal Aviation Administration, FAA/AIR-160, 2008.

operator further agrees to file a flight plan prior to each flight. These rules enhance the safety of the flight in the same way as a notice to airmen (NOTAM). The UAS operator should also have a system in place to check for high airspace usage in the intended operational volume (e.g. a glider competition or a fly-in). In those situations where the UAS operator does not own the airspace in which the operational volume exists, the rules require the UAS operator to request permission prior to entering that airspace.

C.5.2.2. Examples of mitigation by common airspace structure

Example 1: The competent authority establishes a transit corridor through Class B airspace that keeps the UAS separated from other non-UAS airport traffic, and safely separates the corridor traffic in one direction from the traffic in the other direction. The UAS operator intends to fly through this Class B airport airspace, and hence must stay within the established transit corridor and adhere to the transit corridor rules.

Example 2: The UAS operator intends to fly a UAS from one location to another, and files a flight plan with a U-space service provider or the procedural separation system. As the UAS takes off, the U-space service provider then guarantees separation by procedural control of all the aircraft in the airspace. Procedural controls are the take-off windows, reporting points, assigned airways and altitudes, route clearances, etc. required for safe operation.

C.6 Reducing the initial air risk class (ARC) assignment (optional)

This section is intended for an applicant that intends to use strategic mitigations to reduce the collision risk (i.e. ARC). There are two types of ARC:

- (a) the initial ARC, which is a qualitative classification of a UAS operational collision risk within an operational volume before strategic mitigations are applied; and
- (b) the residual ARC, which is a qualitative classification of a UAS operational collision risk in an operational volume after all strategic mitigations are applied.

If a UAS operator agrees that the (generalised) initial ARC applicable to their operation and operational volume is correct, then this step is not necessary, and the assessment should continue at SORA Step #6 (assigning the DAA tactical performance requirement and robustness levels based on the residual collision risk).

If mitigations to reduce the ARC are relevant and are proposed, this section provides information and examples of how to use strategic mitigation(s) to lower the collision risk within the operational volume, and demonstrate the strategy to a competent authority. The examples within the SORA may or may not be applicable or acceptable to the competent authority; however, the SORA encourages an open dialogue between the applicant and the competent authority to determine what is acceptable evidence.

C.6.1 Lowering the initial ARC to the residual ARC-a in any operational volume (optional)

ARC-a is intended for operations in atypical/segregated airspace (see Table C.1). Lowering the initial ARC to residual ARC-a requires a higher level of safety verification because it allows a UAS operator to operate without any tactical mitigation.

To demonstrate that an operation could be reduced to a residual ARC-a, the UAS operator should demonstrate:

- (a) that the operational volume can meet the requirements of SORA atypical/segregated airspace; and
- (b) compliance with any other requirements mandated by the competent authority for the intended operational volume.

A residual ARC-a assessment does necessarily exempt the UAS operator from the requirements to 'see and avoid' and to 'remain well clear from' other aircraft. If the designated competent authority allows the UAS operator a residual ARC-a assessment for the operational volume, in order to comply with the SERA Regulation, the UAS operator must either provide a valid means and equipment as an alternate means of compliance for the 'see and avoid' requirement, or the competent authority must waive the requirement to 'see and avoid' and 'remain well clear.'

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

There may be many methods by which a UAS operator may wish to demonstrate a suitable air risk and strategic mitigations. The SORA does not dictate how this is achieved, and instead, allows the applicant to propose and demonstrate the suitability and effectiveness of their strategic mitigations. It is important for both the UAS operator and the competent authority to understand that the assessment may be qualitative in nature, and where possible, augmented with quantitative data to support the qualitative assumptions and decisions. The UAS operator and the competent authority should understand there may not be a clear delineation of the decision points, so common sense and the safety of manned aircraft should be of paramount consideration.

The SORA provides a two-step method to reduce the air risk by operational mitigation. The first step is to determine the initial ARC by using the potential air risk encounter rate based on known airspace densities (as per Table C.1). The second step is to reduce the initial risk through UAS operator-provided evidence that demonstrates that the intended operation is more indicative of another airspace volume and an encounter rate that corresponds to a lower risk classification (ARC); hence, reducing the initial ARC to a residual ARC (as per Table C.2). This requires the agreement of the competent authority before the ARC may be reduced.

The SORA used expertise from subject matter experts to rate the airspace encounter category (AEC) and the variables that influence the encounter rates (i.e. proximity, geometry, and dynamics). The variables are not interdependent, nor do they influence the encounter outcome in the same manner. A small increase in one encounter rate variable can have major effects on the collision risk; conversely, a small increase in another variable could have limited effect on the collision risk. Hence, lowering the aircraft density of an AEC airspace does not equate to a direct and equal lowering of the ARC risk level. There is no direct correlation between an individual AEC variable and the ARC collision risk levels. In summary:

- (a) there are three inter-dependent variables that affect the ARC;
- (b) the contribution of each variable to the total collision risk is not the same; and
- (c) for simplicity, the SORA only allows the manipulation of one of the variables: the proximity, i.e. the aircraft density.

The first step to potentially lowering the ARC is to determine the AEC and the associated density rating using Table C.1. 12 operational/airspace environments were considered for

the SORA air risk classification, and they correspond to the 12 scenarios found in Figure 4 of the SORA main body.

Operational environment, AEC and ARC			
Operations in:	Initial generalised density rating	Corresponding AEC	Initial ARC
Airport/heliport environment			
OPS in an airport/heliport environment in class B, C or D airspace	5	AEC 1	ARC-d
OPS in an airport/heliport environment in class E airspace or in class F or G	3	AEC 6	ARC-c
Operations above 150 m (~500 ft) AGL but below flight level 600			
OPS > 150 m (~500 ft) AGL but < FL 600 in a Mode-S Veil or transponder mandatory zone (TMZ)	5	AEC 2	ARC-d
OPS > 150 m (~500 ft) AGL but < FL 600 in controlled airspace	5	AEC 3	ARC-d
OPS > 150 m (~500 ft) AGL but < FL 600 in uncontrolled airspace over an urban area	3	AEC 4	ARC-c
OPS > 150 m (~500 ft) AGL but < FL 600 in uncontrolled airspace over a rural area	2	AEC 5	ARC-c
Operations below 150 m (~500 ft) AGL			
OPS < 150 m (~500 ft) AGL in a Mode-S Veil or TMZ	3	AEC 7	ARC-c
OPS < 150 m (~500 ft) AGL in controlled airspace	3	AEC 8	ARC-c
OPS < 150 m (~500 ft) AGL in uncontrolled airspace over an urban area	2	AEC 9	ARC-c
OPS < 150 m (~500 ft) AGL in uncontrolled airspace over a rural area	1	AEC 10	ARC-b
Operations above flight level 600			
OPS > FL 600	1	AEC 11	ARC-b
Operations in atypical or segregated airspace			
OPS in atypical/segregated airspace	1	AEC 12	ARC-a

Table C.1 — Initial air risk class assessment

After determining the initial risk using Table C.1, an applicant may choose to reduce that risk using Table C.2. To understand Table C.2, the first column shows the AEC in the environment in which the UAS operator wishes to operate. Column A shows the associated airspace density rating for that AEC rated from 5 to 1, with 5 being very high density, and 1 being very low density.

Column B shows the corresponding initial ARC.

Column C is key to lowering the initial ARC. This column shows the relative density ratings that a UAS operator should demonstrate to the competent authority in order to argue and justify that the actual local air density rating of the operational area is lower than the rating associated with the initial AEC (Column A) in Table C.1. If this can be shown and accepted by the competent authority, then the new lower ARC level as shown in column D may be applicable.

As stated earlier, the UAS operator is responsible for collecting and analysing the airspace density and for demonstrating the effectiveness of their proposal for strategic mitigations by operational restrictions to the competent authority. In summary, the UAS operator should demonstrate that the restrictions imposed on the UAS operation can lower the risk of a collision by showing that the local airspace encounter rate, under the operational restrictions, is lower than the generalised AEC assessed encounter rate provided in Table C.1.

The strategic mitigation reduction case should be modelled after a safety case. The size and complexity of the strategic mitigation reduction depends entirely on what the UAS operator is trying to do, and where/when they want to do it. The strategic mitigation case as a safety case has two advantages. Firstly, it provides the UAS operator with a structured approach to describe and capture the operation, the hazards identified, the risk analysed, and the threat(s) mitigated. Secondly, it provides a safety case structure that a competent authority is familiar with, which, in turn, helps the competent authority to understand the UAS operator's intended operation and their reasoning as to why a reduction in the ARC can be safely justified.

As each authority is different, the SORA recommends the applicant to contact the competent authority and/or ANSP to determine the format and presentation of the strategic mitigation reduction case.

The density rating of manned aircraft, assessed on a scale of 1 to 5, with 1 representing a very low density and 5 representing a very high density.				
Column	A	B	C	D
AEC	Initial generalised density rating for the environment	Initial ARC	If the local density can be demonstrated to be similar to:	New lowered (residual) ARC
AEC 1 or; AEC 2	5	ARC-d	4 or 3 2 or 1 ^{Note 1}	ARC-c ARC-b
AEC 3	4	ARC-d	3 or 2 1 ^{Note 1}	ARC-c ARC-b
AEC 4	3	ARC-c	1 ^{Note 1}	ARC-b
AEC 5	2	ARC-c	1 ^{Note 1}	ARC-b
AEC 6 or; AEC 7 or; AEC 8	3	ARC-c	1 ^{Note 1}	ARC-b
AEC 9	2	ARC-c	1 ^{Note 1}	ARC-b
<i>Note 1: The reference environment for assessing density is AEC 10 (OPS < 400 ft AGL over rural areas).</i>				
AEC10 and AEC 11 are not included in this table, as any ARC reduction would result in ARC-a. A UAS operator claiming a reduction to ARC-a should demonstrate that all the requirements that define atypical or segregated airspace have been met.				

Table C.2

To fully understand the above, the SORA provides three examples.

Example 1:

A UAS operator intends to operate in an airport/heliport environment, in class C airspace, which corresponds to AEC 1.

The UAS operator enters the initial ARC reduction table at Row AEC 1. Column A shows that the generalised airspace density of this environment is 5. Column B shows the associated initial ARC as ARC-d. Column C indicates that if a UAS operator can demonstrate that the actual, local airspace density corresponds to a generalised density rating of 3 or 4, then the ARC level may be reduced to a residual ARC-c (Column D). If a UAS operator demonstrates that the local airspace density corresponds more to scenarios with a density of 2 or 1, then the ARC level may be lowered to a residual ARC-b (Column D).

Example 2:

A UAS operator intends to operate in an airport/heliport environment, in class G airspace, with a corresponding level of AEC 6.

The UAS operator enters the initial ARC reduction table at Row AEC 6. Column A shows that the generalised airspace density rating that corresponds with this environment is 3. Column B shows the associated initial ARC as ARC-c. Column C indicates that if a UAS operator can demonstrate that the actual, local, airspace density corresponds more to the reference scenario that has a generalised density rating of 1, namely AEC 10, then the residual ARC level may be reduced to ARC-b (Column D).

Example 3:

A UAS operator intends to operate below 150m (~500 ft) AGL, in a class G (uncontrolled) airspace, over an urbanised area, with a corresponding level of AEC 9.

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

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

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

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

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

SORA does not allow the initial ARC to be lowered through strategic mitigation by common structures and rules for all operations in AEC 1, 2, 3, 4, 5, and 11¹. Outside the scope of SORA, a UAS operator may appeal to the competent authority to lower the ARC by strategic mitigation by using common structures. The determination of acceptability falls under the normal airspace rules, regulations and safety requirements for ATM/ANS providers.

Similarly, SORA does not allow for lowering the initial ARC through strategic mitigation by using common structures and rules for all operations in AEC 10².

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

SORA does allow for lowering the initial ARC through strategic mitigation by structures and rules for all operations below 150 m (~500 ft) AGL within VLL airspace (AECs 7, 8, 9 and 10).

To claim an ARC reduction, the UAS operator should show the following:

- (a) the UA is equipped with an electronic cooperative system, and navigation and anti-collision lighting³;
- (b) a procedure has been implemented to verify the presence of other traffic during the UAS flight operation (e.g. checking other aircraft's filed flight plans, NOTAMs⁴, etc.);
- (c) a procedure has been implemented to notify other airspace users of the planned UAS operation (e.g. filing of the UAS flight plan, applying for a NOTAM from the service provider for UAS⁵ operations, etc.);
- (d) permission has been obtained from the airspace owner to operate in that airspace (if applicable);
- (e) compliance with the airspace UAS flight rules, the UAS Regulation, and the policies, etc. applicable to the UAS operational volume and with which all/most aircraft are required to comply (these flight rules, the UAS Regulation, and policies are aimed primarily at UAS operations in VLL airspace);
- (f) a UAS airspace structure (e.g. U-space) exists in VLL airspace to help keep UAS separated from manned aircraft. This structure must be complied with by all UAS in accordance with the EU⁶ or national regulations;

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

² AEC 10: the initial ARC is ARC-b. To lower the ARC in these volumes of airspace (to ARC-a) requires the operational volume to meet one of the requirements of atypical/segregated airspace.

³ Although the SORA takes into account the questionable effects of anti-collision lighting, it also takes into account that the installation of anti-collision lights is often relatively simple and has a net positive effect in preventing collisions.

⁴ Although NOTAMs are used here as an example, the use of NOTAMs may not be acceptable unless they cover all operations in VLL airspace. It is envisioned that a separate system like that of NOTAMs, which specifically addresses the concerns of VLL airspace, will fulfil this requirement.

⁵ Although flight plans and posting NOTAMS are used here as examples, the use of flight plans and NOTAMs may not be acceptable unless they cover all operations in VLL airspace. It is envisioned that a separate system, which specifically addresses the concerns of VLL airspace, will fulfil this requirement.

⁶ The U-space regulation and the relevant adaptation of SERA will apply

- (g) a UAS airspace procedural separation service has been implemented for VLL airspace. The use of this service must be mandatory for all UAS to keep UAS separated from manned aircraft¹ in accordance with the SERA Regulation; and
- (h) all UAS operators can directly communicate with the air traffic controller or flight information services directly or through a U-space service provider in accordance with the SERA Regulation (EU).

C.6.3.1 Demonstration of strategic mitigation by structures and rules

The UAS operator is responsible for collecting and analysing the data required to demonstrate the effectiveness of their strategic mitigations by structures and rules to the competent authority.

C.7 Determination of the residual ARC risk level by the competent authority

As stated before, the UAS operator is responsible for collecting and analysing the data required to demonstrate the effectiveness of all their strategic mitigations to the competent authority.

The competent authority makes the final determination of the airspace residual ARC level.

Caution: As the SORA breaks down collision mitigation into strategic and tactical parts, there can be some overlap between all these mitigations. The UAS operator and the competent authority need to be cognisant and to ensure that mitigations are not counted twice.

Although the static generalised risk (i.e. ARC) is conservative, there may be situations where that conservative assessment may be insufficient. In those situations, the competent authority may raise the ARC to a level that is higher than that advocated by the SORA.

For example, a UAS operator surveys a forest near an airport for beetle infestation, and the airspace was assessed as being ARC-b. The airport is hosting an air show. The competent authority informs the UAS operator that during the week of the air show, the ARC for that local airspace will be ARC-d. The UAS operator can either equip for ARC-d airspace or suspend operations until the air show is over.

¹ This refers to possible future applications of an automated traffic management separation service for unmanned aircraft in a U-space environment. These applications may not exist as such today. A subscription to these services may be required.

Annex D to AMC1 to Article 11

ED Decision 2019/021/R

TACTICAL MITIGATION COLLISION RISK ASSESSMENT

D.1 Introduction-tactical mitigation

The target audience for Annex D is the UAS operator who wishes to apply TMPR, robustness, integrity, and assurance levels for their operation.

Annex D provides the tactical mitigation(s) used to reduce the risk of a mid-air collision. The TMPR is driven by the residual collision risk of the airspace. Some of these tactical mitigations may also provide means of compliance with point SERA.3201 of the SERA Regulation, and the additional requirements of various states.

The air-risk model has been developed to provide a holistic method to assess the risk of an air encounter, and to mitigate the risk that an encounter develops into a mid-air collision. The SORA air-risk model guides the UAS operator, the competent authority, and/or ANSP in determining whether an operation can be conducted in a safe manner. This Annex is not intended to be used as a checklist, nor does it provide answers to all the challenges of DAA. The guidance allows a UAS operator to determine and apply a suitable means of mitigation to reduce the risk of a mid-air collision to an acceptable level. This guidance does not contain prescriptive requirements, but rather objectives to be met at various levels of robustness.

D.2 Principles

The mitigation of the risk that an encounter develops into a mid-air collision is a highly dynamic, variable, and complicated process. To simplify the process, the air-risk model takes a more qualitative approach to arrive at an initial aggregated airspace risk assessment. After an assessment of the initial, unmitigated risk of an encounter, and optional application of strategic mitigations, this Annex assigns a performance requirement on the UAS operation to mitigate the remaining collision hazard (i.e. the residual airspace risk).

D.3 Scope, assumptions and definitions

See Annex C for the scope and assumptions

D.4 Knowledge of terms and definitions

To understand this section, the following SORA definitions need to be understood:

- (a) atypical/segregated vs other airspace;
- (b) AEC (see Annex C);
- (c) initial ARC (see Annex C);
- (d) residual ARC (see Annex C);
- (e) ICAO conflict management (see ICAO Doc 9854, Section 2.7);
- (f) strategic mitigation (see Annex C);
- (g) tactical mitigations and feedback loops; and
- (h) VLOS and BVLOS.

D.5 TMPR assignment

A tactical mitigation is a mitigation applied after take-off, and for the air risk model, it takes the form of a 'mitigating feedback loop'. This feedback loop is dynamic in that it reduces the rate of

collision by modifying the geometry and dynamics of the aircraft in conflict, based on real-time aircraft conflict information.

SORA tactical mitigations are applied to cover the gap between the residual risk of an encounter (the residual ARC) and the airspace safety objectives. The residual risk is the remaining collision risk after all strategic mitigations are applied.

D.5.1 Two classifications of tactical mitigation

There are two classifications of tactical mitigations within the SORA, namely:

- (a) VLOS, whereby a pilot and/or observer uses (use) human vision to detect aircraft and take action to remain well clear from and avoid collisions with other aircraft.
- (b) BVLOS, whereby an alternate means of mitigation to human vision, as in machine or machine assistance¹, is applied to remain well clear from and avoid collisions with other aircraft (e.g. ATC separation services, TCAS, DAA, U-space, etc.).

D.5.2 TMRP using VLOS

Originally the regulations for ‘see and avoid’ and ‘avoid collisions’, defined in point SERA.3201 of the SERA Regulation, assumed that a pilot was on board the aircraft. With UA, this assumption is no longer valid, as the aircraft is piloted remotely.

Under VLOS, the pilot/UAS operator accomplishes ‘see and avoid’ by keeping the UAS within their VLOS. The UAS remains close enough to the remote pilot/observer to allow them to see and avoid another aircraft with human vision unaided by any device other than, perhaps, corrective lenses. VLOS is generally considered an acceptable means of compliance with the ‘remain well clear from’ and ‘avoiding collisions’ requirements of point SERA.3201 of the SERA Regulation.

VLOS generally provides sufficient mitigation for cases where the requirements for tactical mitigations are low, medium, and high. Different states may have other rules and restrictions for VLOS operations (e.g. altitudes, horizontal distances, times for relaying critical flight information, UAS operator/observer training, etc.). In some situations, the competent authority may decide that VLOS does not provide sufficient mitigation for the airspace risk, and may require compliance with additional rules and/or requirements. It is the UAS operators’ responsibility to comply with these rules and requirements.

The UAS operator should produce a documented VLOS de-confliction scheme, explaining the methods that will be applied for detection and the criteria used to avoid incoming traffic. If the remote pilot relies on detection by observers, the use of communication phraseology, procedures, and protocols should be described. Since the VLOS operation may be sufficiently complex, a requirement to document and approve the VLOS strategy is necessary before approval by the competent authority.

The use of VLOS as a mitigation does not exempt the UAS operator from performing the full SORA risk analysis.

D.5.3 TMRP using BVLOS

Since VLOS has operational limitations, there was a concerted effort to find an alternate means of compliance with the human ‘see and avoid’ requirements. This alternate means of mitigation is loosely described as ‘detect and avoid (DAA)’. DAA can be achieved in several ways, e.g. through ground-based DAA systems, air-based DAA systems, or some

¹ For the purposes of this dissection, systems like ATC separation services would be considered to be machine assisted.

combination of the two. DAA may incorporate the use of various sensors, architectures, and even involve many different systems, a human in the loop, on the loop, or no human involvement at all.

TMPR provides tactical mitigations to assist the pilot in detecting and avoiding traffic under BVLOS conditions. The TMPR is the amount of tactical mitigation required to further mitigate the risks that could not be mitigated through strategic mitigation (the residual risk). The amount of residual risk is dependent on the ARC. Hence, the higher the ARC, the greater the residual risk, and the greater the TMPR.

Since the TMPR is the total performance required by all tactical mitigation means, tactical mitigations may be combined. When combining multiple tactical mitigations, it is important to recognise that the mitigation means may interact with each other, depending on the level of interdependency. This may negatively affect the effectiveness of the overall mitigation. Care should be exercised not to underestimate the negative effects of interactions between mitigation systems. Regardless of whether mitigations or systems are dependent or independent, when they act on the same event, unintended consequences may occur.

D.5.3.1 TMPR assignment risk ratio

The SORA TMPR is based on the findings of several studies. These studies provide performance guidance using risk ratios. Table shows the SORA TMPR risk ratio requirements derived from those studies.

Air-Risk Class	TMPR	TMPR system risk ratio objectives
ARC-d	high performance	system risk ratio ≤ 0.1
ARC-c	medium performance	system risk ratio ≤ 0.33
ARC-b	low performance	system risk ratio ≤ 0.66
ARC-a	No performance requirement	No system risk ratio guidance; although the UAS operator/applicant may still need to show some form of mitigation as deemed necessary by the competent authority

Table D.1 — TMPR risk ratio requirements table

Table provides TMPR qualitative criteria as a qualitative means of compliance to help UAS operators translate the risk ratio quantitative values found in Table D.1 into system qualitative functional requirements. Table D.3 provides guidance for the TMPR integrity and assurance objectives for compliance with the objectives of Table C.1.

For the purpose of this assessment, the objectives of Table D.1 take precedence over the guidance provided in Tables D.2 and D.3.

D.5.3.2 TMPR qualitative criterion table

Table D.2, below, shows more qualitative criteria for the different functions and levels of the TMPR. The qualitative criteria are divided into five sub-functions of DAA, namely: detect, decide, command, execute, and the feedback loop. Where reference is made to the detection of a percentage of all aircraft, this should be read as a detection rate of the overall mix of aircraft anticipated to be encountered

in the detection volume, and not limited to the detection of just the subset of aircraft in the mix.

	Function	TMPR Level				
		VLOS	No Requirement (ARC-a)	Low (ARC-b)	Medium (ARC-c)	High (ARC-d)
Tactical mitigation performance requirements (TMPR)	Detect ¹	No Requirement	No Requirement	The expectation is for the applicant's DAA Plan to enable the operator to detect approximately 50 % of all aircraft in the detection volume². This is the performance requirement in the absence of failures and defaults. It is required that the applicant has awareness of most of the traffic operating in the area in which the operator intends to fly, by relying on one or more of the following: • Use of (web-based) real time aircraft tracking services • Use Low Cost ADS-B In /UAT/FLARM³/Pilot Aware³ aircraft trackers • Use of UTM/U-space Dynamic Geofencing⁴ • Monitoring aeronautical radio communications (e.g. use of a scanner)⁵	The expectation is for the applicant's DAA Plan to enable the operator to detect approximately 90 % of all aircraft in the detection volume². To accomplish this, the applicant will have to rely on one or a combination of the following systems or services: • Ground based DAA /RADAR • FLARM^{3/6} • Pilot Aware^{3/6} • ADS-B In/ UAT In Receiver⁶ • ATC Separation Services⁷ • UTM/U-space Surveillance Service⁴ • UTM/U-space Early Conflict Detection and Resolution Service⁴ • Active communication with ATC and other airspace users⁵. The operator provides an assessment of the effectiveness of the detection tools/methods chosen.	A system meeting RTCA SC-228 or EUROCAE WG-105 MOPS/MASPS (or similar) and installed in accordance with applicable requirements.

¹For an in-depth understanding of the derivation, please see Annex G. Detection should be done with adequate precision for the avoidance manoeuvre to be effective.

²The detection volume is the volume of airspace (temporal or spatial measurement) which is required to avoid a collision (and remain well clear if required) with manned aircraft. It can be thought of as the last point at which a manned aircraft must be detected, so that the DAA system can perform all the DAA functions. The detection volume is not tied to the sensor(s) Field of View/Field of Regard. The size of the detection volume depends on the aggravated closing speed of traffic that may reasonably be encountered, the time required by the remote pilot to command the avoidance manoeuvre, the time required by the system to respond and the manoeuvrability and performance of the aircraft. The detection volume is proportionally larger than the alerting threshold.

³FLARM and PilotAware are commercially available (trademarked) products/brands. They are referenced here only as example technologies. The references do not imply an endorsement by the approval authority for the use of these products. Other products offering similar functions may also be used.

⁴These refer to possible future applications of automated traffic management systems for unmanned aircraft in an UTM/U-space environment. These applications may not exist as such today.

⁵If permitted by the authority. May require a Radio-License or Permit.

⁶The selection of systems to aid in electronic detection of traffic should be made considering the average equipment of the majority of aircraft operating in the area. For example: in areas where many gliders are known to operate, the use of FLARM or similar systems should be considered whereas for operations in the vicinity of large commercially operated aircraft, ADS-B IN is probably more appropriate. These refer to possible future applications of automated traffic management systems for unmanned aircraft in an UTM/U-space environment. These applications may not exist as such today. A subscription to these services may be required.

⁷The selection of systems to aid in electronic detection of traffic should be made considering the average equipment of the majority of aircraft operating in the area.

	Function	TMPR Level				
		VLOS	No Requirement (ARC-a)	Low (ARC-b)	Medium (ARC-c)	High (ARC-d)
Tactical mitigation performance requirements (TMPR)	Decide	No Requirement	No Requirement	The UAS operator should have a documented de-confliction scheme, in which the UAS operator explains which tools or methods will be used for detection and what the criteria are that will be applied for the decision to avoid incoming traffic. In case the remote pilot relies on detection by someone else, the use of phraseology will have to be described as well. Examples: • The operator will initiate a rapid descend if traffic is crossing an alert boundary and operating at less than 1000ft. • The observer monitoring traffic uses the phrase: 'DESCEND!', 'DESCEND!', 'DESCEND!'.	All requirements of ARC-b and in addition: 1. The operator provides an assessment of the human/machine interface factors that may affect the remote pilot's ability to make a timely and appropriate decision. 2. The UAS operator provides an assessment of the effectiveness of the tools and methods utilised for the timely detection and avoidance of traffic. In this context timely is defined as enabling the remote pilot to decide within 5 seconds after the indication of incoming traffic is provided. The UAS operator provides an assessment of the failure rate or availability of any tool or service the UAS operator intends to use.	A system meeting RTCA SC-228 or EUROCAE WG-105 MOPS/MASPS (or similar) and installed in accordance with applicable requirements.

	Function	TMPR Level				
		VLOS	No Requirement (ARC-a)	Low (ARC-b)	Medium (ARC-c)	High (ARC-d)
Tactical mitigation performance requirements (TMPR)	Command	No Requirement	No Requirement	The latency of the whole command (C2) link, i.e. the time between the moment that the remote pilot gives the command and the airplane executes the command should not exceed 5 seconds.	The latency of the whole command (C2) link, i.e. the time between the moment that the remote pilot gives the command and the airplane executes the command should not exceed 3 seconds.	A system meeting RTCA SC-228 or EUROCAE WG-105 MOPS/MASPS (or similar) and installed in accordance with applicable requirements.

	Function	TMPR Level				
		VLOS	No Requirement (ARC-a)	Low (ARC-b)	Medium (ARC-c)	High (ARC-d)
Tactical mitigation performance requirements (TMPR)	Execute	No Requirement	No Requirement	UAS descending to an altitude not higher than the nearest trees, buildings or infrastructure or ≤ 60 feet AGL is considered sufficient. The aircraft should be able to descend from its operating altitude to the 'safe altitude' in less than a minute.	Avoidance may rely on vertical and horizontal avoidance manoeuvring and is defined in standard procedures. Where horizontal manoeuvring is applied, the aircraft shall be demonstrated to have adequate performance, such as airspeed, acceleration rates, climb/descend rates and turn rates. The following are suggested minimum performance criteria: ¹⁰ - Airspeed: ≥ 50 knots - Rate of climb/descend: ≥ 500 ft/min - Turn rate: ≥ 3 degrees per second	A system meeting RTCA SC-228 or EUROCAE WG-105 MOPS/MASPS (or similar) and installed in accordance with applicable requirements.

¹⁰ Low End Performance Representative (LEPR) performance requirements for RTCA SC-228 Study 5

	Function	TMPR Level				
		VLOS	No Requirement (ARC-a)	Low (ARC-b)	Medium (ARC-c)	High (ARC-d)
Tactical mitigation performance requirements (TMPR)	Feedback Loop	No Requirement	No Requirement	Where electronic means assist the remote pilot in detecting traffic, the information is provided with a latency and update rate for intruder data (e.g. position, speed, altitude, track) that support the decision criteria. For an assumed 3 NM threshold, a 5 second update rate and a latency of 10 seconds is considered adequate (see example below).	The information is provided to the remote pilot with a latency and update rate that support the decision criteria. The applicant provides an assessment of the aggravated closure rates considering traffic that could reasonably be expected to operate in the area, traffic information update rate and latency, C2 Link latency, aircraft manoeuvrability and performance and sets the detection thresholds accordingly. The following are suggested minimum criteria: Intruder and ownship vector data update rates: ≤ 3 seconds.	A system meeting RTCA SC-228 or EUROCAE WG-105 MOPS/MASPS (or similar) and installed in accordance with applicable airworthiness requirements.

Table D.2 — TMPR qualitative criteria table

D.5.3.3 Effects of aircraft equipment on tactical system performance

The performance of a tactical mitigation is affected by the equipment of both the UAS and threat aircraft, on an encounter-by-encounter basis. A tactical mitigation mitigates the encounter risk by using a set of sub-functions of the DAA routine,

namely see/detect, decide, command, execute, and feedback loop. Equipment that aids these sub-functions increases the overall performance of the tactical mitigation system.

The following example illustrates how the equipment of both the UAS and threat aircraft affects the overall tactical performance. Given a threat aircraft equipped with a transponder, it is easier for other aircraft to detect and track the threat aircraft. In this case, the UAS can be equipped with a system that is able to detect and track transponders. However, a UAS that mitigates the risk by locating the threat aircraft by detecting their transponder (e.g. through ACAS-II V. 7.1) cannot use the same approach to mitigate the risks posed by an aircraft without a transponder.

Tactical mitigation equipment is not homogeneous within the airspace. Different classes of airspace have different mixes of equipment. General aviation aircraft tend to be less well-equipped than commercial aircraft. There will be differences in the mix of general aviation/commercial aircraft from one location/airspace to another. Based on the aircraft equipment, a specific tactical system (e.g. FLARM, ACAS, etc.) could mitigate the risk of a collision in some classes of airspace and not in others.

Therefore, the UAS operator needs to understand the effectiveness of their tactical mitigation systems within the context of the airspace in which they intend to operate, and select systems used for tactical mitigation accordingly. A TCAS II 7.1/ACAS-II equipped UAS will not mitigate all the encounter risks in an area where sailplanes equipped with FLARM are known to operate.

D.5.4. TMRP robustness (integrity and assurance) assignment

Table D.3, below, lists the recommended requirements to comply with the TMRP integrity and assurance assignment.

		TMPR: N/A (ARC-a)	TMPR: Low (ARC-b)	TMPR: Medium (ARC-c)	TMPR: High (ARC-d)
Level of integrity	Criteria	Allowable loss of function and performance of the Tactical Mitigation System: < 1 per 100 Flight Hours (1E-2 Loss/FH)	Allowable loss of function and performance of the Tactical Mitigation System: < 1 per 100 Flight Hours (1E-2 Loss/FH)	Allowable loss of function and performance of the Tactical Mitigation System: < 1 per 1 000 Flight Hours (1E-3 Loss/FH)	Allowable loss of function and performance of the Tactical Mitigation System: < 1 per 100 000 Flight Hours (1E-5 Loss/FH)
	Comments / Notes	The requirement is considered to be met by commercially available products. No quantitative analysis is required.	The requirement is considered to be met by commercially available products. No quantitative analysis is required.	This rate is commensurate with a probable failure condition. These failure conditions are anticipated to occur one or more times during the entire operational life of each aircraft.	A quantitative analysis is required.
		TMPR: N/A (ARC-a)	TMPR: Low (ARC-b)	TMPR: Medium (ARC-c)	TMPR: High (ARC-d)
Level of assurance	Criteria	N/A	The operator declares that the tactical mitigation system and procedures will mitigate the risk of collisions with manned aircraft to an acceptable level.	The operator provides evidence that the tactical mitigation system will mitigate the risk of collisions with manned aircraft to an acceptable level.	The evidence that the tactical mitigation system will mitigate the risk of collisions with manned aircraft to an acceptable level is verified by a competent third party.
	Comments / Notes	N/A	N/A	N/A	N/A

Table D.3 — TMPR integrity and assurance objectives

D.6 Maintenance and continued airworthiness

The DAA maintenance and continued airworthiness requirements are addressed in the SAIL requirements; please refer to Annex E.

Annex E to AMC1 to Article 11

ED Decision 2025/018/R

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

E.1 How to use SORA Annex E

The following Table E.1 provides the basic principles to consider when using SORA Annex E.

	Principle description	Additional information
#1	Annex E provides assessment criteria for the integrity (i.e. safety gain) and assurance (i.e. method of proof) of the OSOs proposed by an applicant.	The identification of OSOs for a given operation is the responsibility of the UAS operator. The relationship between the SAIL and the low/medium/high level of robustness of an OSO can be found in Step #9, see Section S.4.9 of this AMC (SORA Main Body).
#2	Annex E does not cover the LoI of the competent authority. The LoI is based on the competent authority's assessment of the applicant's ability to perform the given operation.	
#3	When more than one criterion exists for a given level of integrity/assurance in an OSO, all the criteria need to be met at the required integrity/assurance level to satisfy the given OSO.	
#4	'Not required (NR)' cases defined in Section S.4.9.3 of this AMC (SORA Main Body) Table 14 do not need to be defined in terms of integrity and assurance levels in Annex E.	UAS operators are encouraged to consider also the OSOs classified as 'NR', at least with 'low' level of integrity and assurance.
#5	When the criteria to assess the level of integrity or assurance of an OSO rely on 'standards' that are not yet available, the OSO needs to be developed in a manner acceptable to the competent authority.	
#6	Annex E intentionally uses non-prescriptive terms (e.g. suitable, reasonably practicable) to provide flexibility to both the applicant and the competent authorities. This does not constrain the applicant from proposing mitigations, nor the competent authority from evaluating what is needed on a case-by-case basis.	
#7	This annex in its entirety also applies to single-person organisations.	
#8	Some of the OSOs refer to the functional-test-based (FTB) approach which is described in detail in Section E.3.	

Table E.1 – Basic principles to consider when using SORA Annex E

E.2 Operational safety objectives (OSOs)

OSO #01 — Ensure that the UAS operator is a competent and/or proven organisation

TECHNICAL ISSUE WITH THE UAS		LEVEL of INTEGRITY		
		Low (SAIL II)	Medium (SAIL III)	High (SAIL IV to VI)
OSO #01 Ensure that the UAS operator is competent and/or proven organisation	Criterion	The UAS operator is knowledgeable of the UAS ¹ being used and as a minimum has the following relevant operational procedures ² : (a) checklists, (b) maintenance, (c) training, responsibilities, and associated duties.	Same as 'low'. In addition, the UAS operator has set up an organisation appropriate ³ for the UAS operation, with at least the following in place: (a) a method to continuously evaluate whether the operator is operating according to the terms of the operational authorisation and check whether the mitigations proposed as part of the operational authorisation are still appropriate; (b) occurrence analysis procedures and reporting to the UAS designer in case of design-related in-service events.	The UAS operator has an adequate organisational management system.
	Comments	¹ Including monitoring of any related airworthiness directives or recommendations issued by national aviation authorities and UAS designer recommendations (service bulletins, service information letters, etc.). ² Operational procedures (checklists, maintenance, training, etc.) can be justified in the context of other applicable OSOs.	³ For the purpose of this assessment, 'appropriate' should be interpreted as commensurate with/proportionate to the size of the organisation and the complexity of the operation.	N/A

TECHNICAL ISSUE WITH THE UAS	LEVEL of ASSURANCE		
	Low (SAIL II)	Medium (SAIL III)	High (SAIL IV to VI)

OSO #01 Ensure that the UAS operator is a competent and/or proven organisation	Criterion	The elements delineated in the level of integrity are available and addressed in the operations manual.	Prior to the first operation, the competent authority of the Member State or an entity that is designated by the competent authority performs an audit of the organisation.	The UAS operator holds a light UAS operator certificate (LUC) according to PART C of Implementing Regulation (EU) 2019/947 or an air operator certificate (AOC) according to Regulation (EU) No 965/2012 or equivalent or, if the applicant is a design or production organisation, holds an approval according to Subpart J or P of Annex I (Part 21) to Regulation (EU) No 748/2012.
	Comments	N/A	<i>Audits should be adapted to the size and scope of the organisation and focus on items that can be connected to the applicable OSOs and their robustness depending on the SAIL of the operation. Audits can take the form of desk reviews, if deemed appropriate.</i>	

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

TECHNICAL ISSUE WITH THE UAS		LEVEL of INTEGRITY		
		Low (SAIL III)	Medium (SAIL IV)	High (SAIL V & VI)
OSO #02 UAS designed and produced by a competent and/or proven organisation	Criterion for design	As a minimum, design documentation covers: (a) the specification of the materials; (b) the suitability and durability of the materials used; and (c) configuration control.	Same as 'low'. In addition, design documentation also covers identification and traceability.	The UAS designer complies with Subpart J of Annex I (Part 21) to Regulation (EU) No 748/2012.
	Criterion for production	As a minimum, production procedures cover: (a) the configuration control. (b) the processes necessary to allow for repeatability in manufacturing; and (c) conformity within acceptable tolerances.	Same as 'low'. In addition, production procedures also cover: (a) the verification of incoming products, parts, materials, and equipment; (b) identification and traceability; (c) in-process and final inspections and testing; (d) the control and calibration of tools; (e) handling and storage; and (f) the control of non-conforming items.	The production organisation complies with the organisational requirements that are defined in Subpart F or G of Annex I (Part 21) to Regulation (EU) No 748/2012.
	Comments	N/A	N/A	N/A

TECHNICAL ISSUE WITH THE UAS		LEVEL of ASSURANCE		
		Low (SAIL III)	Medium (SAIL IV)	High (SAIL V & VI)
OSO #02 UAS designed and produced by a	Criterion for design	The UAS operator should use a UAS for which the UAS designer has issued a statement of	The UAS operator should use a UAS for which EASA has verified the claimed integrity through a design verification	The UAS operator should operate a UAS designed by an organisation approved by EASA according to Subpart J of Annex I (Part 21) to

competent and/or proven organisation		compliance with MoC to OSO #02 ¹ using the form attached to the MoC.	report (DVR) issued following an application from the UAS designer.	Regulation (EU) No 748/2012 following an application from the UAS designer
	Comments	¹ https://www.easa.europa.eu/en/document-library/product-certification-consultations/means-compliance-moc-design-uas-operated-sail <i>Note:</i> EASA is in the process of developing the means of compliance for all OSOs. Once developed, they will be made available at the link above.		
	Criterion for production	The declared production procedures are developed to a standard that is considered adequate by the competent authority that issues the operational authorisation and/or in accordance with means of compliance acceptable to the competent authority.	Same as 'low' In addition, evidence is available that the UAS has been produced in conformity with its design.	Same as 'medium'. In addition, the competent authority of the Member State or an entity that is designated by the competent authority validates compliance with the production organisation requirements that are defined in Subpart F or G of Annex I (Part 21) to Regulation (EU) No 748/2012 following an application from the UAS production organisation.
	Comments	N/A	N/A	N/A

OSO #03 — Maintenance of UAS

TECHNICAL ISSUE WITH THE UAS		LEVEL of INTEGRITY		
		Low (SAIL I & II)	Medium (SAIL III & IV)	High (SAIL V & VI)
OSO #03 Maintenance of UAS	Criterion #1 (Design)	The UAS designer's <u>maintenance instructions</u> and requirements to ensure a safe operation are defined.	Same as 'low'. In addition, the UAS designer's scheduled maintenance requirements are defined.	
	Criterion #2 (Procedure)	(a) The UAS operator's ¹ <u>maintenance instructions</u> ² and requirements ³ are defined, covering the applicable UAS designer's instructions and requirements ^{4,5} , and are adhered to. (b) The maintenance staff is competent and has received an authorisation by the UAS operator to carry out UAS maintenance.	Same as 'low'. In addition: (a) Preventive/scheduled maintenance/inspection of each UAS is organised in accordance with the UAS operator's <u>maintenance programme</u> , established on the basis of the UAS designer's scheduled maintenance requirements ⁴ and adapted to the specificities of the intended UAS operations. (b) Upon completion, the maintenance log system is used to record all the maintenance conducted on the UAS, including releases. A maintenance release can only be accomplished by a staff member that has received by the UAS operator a maintenance release authorisation for a particular UAS model/family.	Same as 'medium'. In addition, the maintenance staff work in accordance with a <u>maintenance procedure manual</u> that provides information and procedures relevant to the maintenance facility, records, maintenance instructions, release, tools, materials, components, defect deferral, etc. The UAS operator complies with Delegated Regulation (EU) 2024/1107.
	Comments	¹ The maintenance may be carried out by an organisation other than the UAS operator (e.g. use of a third party). ² The UAS operator's maintenance instructions are the information establishing how to carry out the required maintenance/repairs. These instructions are used by maintenance staff while performing maintenance. ³ The UAS operator's maintenance requirements are the needs for maintenance of the UAS (e.g. inspection after hard landing, regular check of lighting system). The UAS operator ensures these requirements are covered in the UAS maintenance instructions. ⁴ The UAS operator may just reuse the UAS designer's instructions and requirements for maintenance. ⁵ The UAS designer's instructions and requirements for maintenance are sometimes referred to as 'ICAs' (Instructions for Continuing Airworthiness).		

TECHNICAL ISSUE WITH THE UAS		LEVEL of ASSURANCE		
		Low (SAIL I & II)	Medium (SAIL III & IV)	High (SAIL V & VI)
OSO #03 Maintenance of UAS	Criterion #1 (Design)	The UAS designer's <u>maintenance instructions</u> and requirements to ensure a safe operation are documented.	Same as 'low'. In addition, the UAS designer's scheduled maintenance requirements are developed and documented in accordance with standards considered adequate by the competent authority of the Member State and/or in accordance with means of compliance acceptable to that authority. If the operation is classified as SAIL III, the UAS operator should use a UAS for which the UAS designer has issued a statement of compliance with MoC to OSO #03 and Light-UAS.2625¹ using the form attached to the MoC. If the operation is classified as SAIL IV, the UAS operator should use a UAS for which EASA has issued a design verification report (DVR) issued following an application from the UAS designer. If the operation is classified as SAIL V and VI, the UAS operator should use a UAS for which EASA has issued a type certificate or a restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012, following an application from the UAS designer.	
	Comments	N/A	¹ https://www.easa.europa.eu/en/document-library/product-certification-consultations/means-compliance-moc-design-uas-operated-sail	
	Criterion #2 (Procedure)	(a) The UAS operator's maintenance instructions are documented¹. (b) The maintenance carried out on the UAS is recorded in a maintenance log system^{2,3}. (c) A list of the maintenance staff authorised to carry out maintenance is established and kept up to date.	Same as 'low'. In addition: (a) The UAS operator's maintenance programme covers the UAS designer's scheduled maintenance requirements and is developed in accordance with standards considered adequate by the competent authority of the Member State and/or in accordance with a means of compliance acceptable to that authority.	Same as 'medium'. In addition, the maintenance programme and the maintenance procedures manual are validated by the competent authority of the Member State or by an entity that is designated by the competent authority.

			(b) A list of the maintenance staff with maintenance release authorisation is established and kept up to date.	The UAS operator complies with Delegated Regulation (EU) 2024/1107.
	Comments	¹ The UAS operator may just reuse the UAS designer's instructions and requirements for maintenance. ² The objective is to record all the maintenance performed on the UA, and why it is performed (rectification of defects or malfunctions, modifications, scheduled maintenance, etc.). ³ The maintenance log may be requested for inspection/audit by the approving authority or an authorised representative.	N/A	N/A
	Criterion #3 (Training)	A record of all the relevant qualifications, experience and/or training completed by the maintenance staff is established and kept up to date.	Same as 'low'. In addition: (a) The <u>initial</u> training syllabus and training standard, including theoretical/practical elements, duration, etc., is defined and is commensurate with the authorisation held by the maintenance staff. (b) For staff that hold a maintenance release authorisation, the <u>initial</u> training is specific to a particular UAS model/family. (c) All maintenance staff have undergone <u>initial</u> training.	Same as 'medium'. In addition: (a) a programme for the <u>recurrent</u> training of staff holding a maintenance release authorisation is established; and (b) that programme is validated by the competent authority of the Member State or by an entity that is designated by the competent authority. The UAS operator complies with Delegated Regulation (EU) 2024/1107.
	Comments	N/A	N/A	N/A

OSO #04 — UAS components essential to safe operations are designed to an airworthiness design standard

- (a) Within the scope of OSO #4, UAS components essential to safe operations are those whose failure would significantly impair the capability of the operator to meet the required target level of safety in terms of loss of control of the operation. The term ‘component’ is meant as including any element of the UAS.
- (b) Starting at SAIL IV, it is considered that the safety objective associated to the SAIL of an operation (e.g. probability of loss of control of the operation below 10^{-4} /FH for a SAIL IV operation) should be achieved with a UAS designed to be compliant with SC Light UAS verified by EASA.

The list of airworthiness design standards (ADSs) to be complied with through OSO #04 is not intended to duplicate the requirements already covered by other design-related OSOs. While OSO #04 aims at ensuring that the UAS as a whole is designed according to an ADS (for example, the design and construction, structure, and flight performance is part of the ADS, but not of other OSOs), other design-related OSOs focus on particular systems/functionalities of the UAS and or technical disciplines (e.g. safety):

- OSO #05 (system safety related),
- OSO #06 (C3 link),
- OSO #07 (conformity check),
- OSO #13 (external services),
- OSO #18 (automatic protection of envelope),
- OSO #20 (HMI),
- OSO #23/#24 (adverse environmental conditions).

TECHNICAL ISSUE WITH THE UAS		LEVEL of INTEGRITY		
		Medium	High	
		(SAIL IV)	(SAIL V)	(SAIL VI)
OSO #04 components essential to safe operations are designed to an airworthiness design standard	Criterion	The UAS components that are essential to safe operations are designed to an airworthiness design standard ¹ considered adequate by EASA and/or in accordance with a means of compliance acceptable to EASA to contribute to the overall safety objective of 10^{-4} /FH for the loss of control of the operation.	The UAS components that are essential to safe operations are designed to an airworthiness design standard ¹ considered adequate by the EASA and/or in accordance with a means of compliance acceptable to EASA to contribute to the overall safety objective of 10^{-5} /FH for the loss of control of the operation.	The UAS components that are essential to safe operations are designed to an airworthiness design standard ¹ considered adequate by EASA and/or in accordance with a means of compliance acceptable to EASA to contribute to the overall safety objective of 10^{-6} /FH for the loss of control of the operation.

	Comments	<i>In case of experimental flights that investigate new technical solutions, the competent authority may accept that recognised standards are not met.</i> ¹ EASA Special Condition Light-UAS is the recommended airworthiness design standard. <i>When aspects of an airworthiness design standard are covered by an OSO (for instance, OSO #05), the OSO requirement takes precedence.</i>

TECHNICAL ISSUE WITH THE UAS		LEVEL of ASSURANCE	
		Medium (SAIL IV)	High (SAIL V & VI)
OSO #04 UAS components essential to safe operations are designed to an airworthiness design standard	Criterion	The UAS operator should use a UAS for which EASA has verified the claimed integrity through a design verification report (DVR) issued following an application from the UAS designer.	The UAS operator should use a UAS for which EASA has issued a type certificate or restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012, following an application from the UAS designer.
	Comment	In case the UAS designer decides to apply OSO #4 for UAS operated in SAIL I to III, MoC Light UAS.FTB may be used (https://www.easa.europa.eu/en/document-library/product-certification-consultations/final-means-compliance-special-condition-light).	N/A

OSO #05 — The UAS is designed considering system safety and reliability

- (a) OSO #05 ensures that the contribution of the UAS, or of any external system supporting the operation, to the loss of control of the operation inside the operational volume is commensurate with the acceptable level of risk associated with each SAIL. The OSO #05 safety objectives are to be considered in conjunction with the containment safety requirements (Step #8 and Section 4 of this Annex) and, when applicable, the ground risk mitigation requirements (Annex B, in particular M2 Criterion #1 requirements). In combination, these three sets of safety objectives ensure that whatever the SAIL of the operation, the target level of safety is met and no single failure is expected to lead to a catastrophic event.
- (b) Note on SAIL II operations: some UAS designs may employ novel or complex features with which the UAS designer has very limited operational experience. If such features are identified by the competent authority or the UAS designer, the UAS designer should assure that the equipment,

systems and installations are designed to minimise hazards in the event of a probable failure of the UAS or of any external system supporting the operation. This should be done through a statement of compliance with a simple written justification from the UAS designer including functional diagrams and a description of how the system functions.

TECHNICAL ISSUE WITH THE UAS		LEVEL of INTEGRITY		
		Low (SAIL III)	Medium (SAIL IV)	High (SAIL V & VI)
OSO #05 The UAS is designed considering system safety and reliability	Criterion	The equipment, systems and installations are designed to minimise ¹ hazards ² in the event of a probable ³ failure of the UAS or of any external system supporting the operation.	Same as 'low'. In addition, the strategy for detection, alerting and management of any failure, which would lead to a hazard, is available.	(a) Major failure conditions are not more frequent than remote; (b) Hazardous failure conditions are not more frequent than extremely remote; (c) Catastrophic failure conditions are not more frequent than extremely improbable; (d) No single failure can lead to a catastrophic failure condition; and (e) SW and AEH whose development error(s) may cause or contribute to hazardous or catastrophic failure conditions are developed to an industry standard or a methodology considered adequate by EASA and/or in accordance with means of compliance acceptable to EASA.
	Comments	¹ The minimisation of the hazard criterion correlates to the contribution of the UAS, and of any external system supporting the operation, to the loss of control of the operation rate, thus the SAIL of the operation. As an example, at SAIL III, the contribution of the UAS, and of any external system supporting the operation, to the loss of control of the operation rate could be 10–4/FH assuming a traditional 10	UAS designers may achieve compliance by using MoC Light UAS.2510 (https://www.easa.europa.eu/en/document-library/product-certification-consultations/means-compliance-moc-design-uas-operated-sai).	

		% contribution of the technical aspects to the safety of an operation. ² For the purpose of this assessment, the term 'hazard' should be interpreted as a failure condition that relates to major and hazardous, (the term 'catastrophic' is intentionally not included since the TLOS is considered met for SAIL I to IV operations with the provision of Note 1 above and, if applicable, M2 requirements in Annex B). ³ For the purpose of this assessment, the term 'probable' should be interpreted in a qualitative way as 'anticipated to occur one or more times during the entire system/operational life of a UAS'.		

TECHNICAL ISSUE WITH THE UAS		LEVEL of ASSURANCE		
		Low (SAIL III)	Medium (SAIL IV)	High (SAIL V & VI)
OSO #05 The UAS is designed considering system safety and reliability	Criterion	A functional hazard assessment^{1,2} and a design and installation³ appraisal that show that hazards are minimised are available. The UAS operator should use a UAS for which the UAS designer has issued a statement of compliance with MoC to OSO #05⁴ using the form attached to the MoC.	Same as low. In addition: (a) The safety assessment is conducted in line with standards considered adequate by EASA and/or in accordance with a means of compliance acceptable to EASA. (b) A strategy for the detection of single failures of concern includes pre-flight checks. The UAS operator should use a UAS for which EASA has validated the claimed integrity through design verification report (DVR) issued following an application from the UAS designer.	The UAS operator should use a UAS for which EASA has issued a type certificate or restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012 following an application from the UAS designer.

TECHNICAL ISSUE WITH THE UAS		LEVEL of ASSURANCE		
		Low (SAIL III)	Medium (SAIL IV)	High (SAIL V & VI)
	Comments	¹ The severity of failure conditions (no safety effect, minor, major, hazardous and catastrophic) should be determined according to the definitions provided in JARUS AMC RPAS.1309 Issue 2. ² EUROCAE ED-280 ‘Guidelines for UAS safety analysis for the specific category (low and medium levels of robustness)’ may be considered to support compliance with this criterion (through a functional hazard analysis (FHA)). ³ A simple written justification from the UAS designer including functional diagrams and a description of how the system works explaining why the integrity claim is met is an acceptable means of compliance. ⁴ https://www.easa.europa.eu/en/document-library/product-certification-consultations/means-compliance-moc-design-uas-operated-sail	EUROCAE ED-280 ‘Guidelines for UAS safety analysis for the specific category (low and medium levels of robustness)’ may be considered acceptable to support compliance with this criterion.	N/A

OSO #06 — C3 link characteristics (e.g. performance, spectrum use) are appropriate for the UAS operation

- (a) For the purpose of the SORA and this specific OSO, the term ‘C3 link’ encompasses:
 - (1) the C2 link; and
 - (2) any communication link required for the safety of the flight.
- (b) To correctly assess the integrity of this OSO, the UAS operator or the UAS designer, as described in the table below, should identify the following:
 - (1) The performance requirements for the C3 links necessary for the UAS operation.

- (2) All the C3 links, together with their actual performance and RF spectrum use.

Note 1: The specification of the performance and the RF spectrum for a C2 link is typically documented by the UAS designer in the UAS flight manual.

Note 2: The main parameters associated with the performance of a C2 link (RLP) and the performance parameters for other communication links (e.g. RCP for communication with ATC) include but are not limited to the following:

- (i) the transaction expiration time;
- (ii) the availability;
- (iii) the continuity; and
- (iv) the integrity.

Refer to the ICAO references for definitions.

- (3) The RF spectrum usage requirements for the UAS operation (including the need for authorisation if required).

Note: Usually, countries publish the allocation of RF spectrum bands applicable in their territories. This allocation stems mostly from the International Communication Union (ITU) Radio Regulations. However, the UAS operator should check the local requirements and request authorisation when needed since there may be national differences and specific allocations (e.g. national subdivisions of ITU allocations). Some aeronautical bands (e.g. AM(R)S, AMS(R)S 5030-5091 MHz) were allocated for potential use in UAS operations within the ICAO scope for UAS operations classified as category 'certified', but their use may be authorised for operations in the 'specific' category. It is expected that the use of other licensed bands (e.g. those allocated to mobile networks) may also be authorised in the 'specific' category. Some unlicensed bands (e.g. industrial, scientific and medical (ISM) or short-range devices (SRDs)) may also be acceptable in the 'specific' category; for instance, for operations with lower integrity requirements.

- (4) Environmental conditions that may affect the performance of C3 links.

TECHNICAL ISSUE WITH THE UAS		LEVEL of INTEGRITY		
		Low (SAIL II & III)	Medium (SAIL IV)	High (SAIL V & VI)
OSO #06 C3 link characteristics (e.g. performance, spectrum use) are appropriate for the UAS operation	Criterion #1 (Operator)	The UAS operator: (a) determines that the performance, RF spectrum use ¹ and environmental conditions for C3 links, as identified in the UAS flight manual ² are adequate to safely conduct the UAS operation. (b) has procedures for the remote pilot to continuously monitor the C3 link performance and ensures that the performance continues to meet the operational requirements ³ .	Same as 'low' ⁴ .	Same as 'low'. In addition, the use of licensed ⁵ frequency bands for C2 links is required.
	Comments	¹ For a low level of integrity, unlicensed frequency bands may be acceptable under certain conditions, e.g. the use of mechanisms to protect against interference (e.g. frequency deconfliction by procedure). ² The UAS designer may provide technical information also in other documentation. ³ The remote pilot has continuous and timely access to the relevant C3 links information that could affect the safety of flight. For operations requesting only 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 strength becomes too low.	⁴ Depending on the operation, the use of licensed frequency bands may be necessary. In some cases, the use of non-aeronautical bands (e.g. licensed bands for cellular network) may be acceptable.	⁵ This ensures a minimum level of performance and is not limited to aeronautical licensed frequency bands (e.g. licensed bands for cellular network). Nevertheless, some operations may require the use of bands allocated to the aeronautical mobile service for the use of a C2 link (e.g. 5030 – 5091 MHz). In any case, the use of licensed frequency bands requires authorisation.
	Criterion #2 (Designer)	The UAS designer determines: (a) the performance and the RF spectrum use ¹ for C3 links and specifies them in the UAS flight manual; (b) that the means to continuously monitor the C3 link performance are available and are defined in the UAS flight manual ² .	Same as 'low' ³ .	Same as 'low'. In addition, the use of licensed ⁴ frequency bands for C2 links is required.

TECHNICAL ISSUE WITH THE UAS		LEVEL of INTEGRITY		
		Low (SAIL II & III)	Medium (SAIL IV)	High (SAIL V & VI)
	Comments	¹ For a low level of integrity, unlicensed frequency bands may be acceptable under certain conditions, e.g.: (a) the UAS designer demonstrates compliance with other RF spectrum use requirements (e.g. Directive 2014/53/EU) by showing that the UAS equipment is compliant with these requirements; and (b) the use of mechanisms to protect against interference (e.g. FHSS). ² The remote pilot has continuous and timely access to the relevant C3 link information that could affect the safety of flight. For operations requesting only 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 strength becomes too low.	³ Depending on the operation, the use of licensed frequency bands might be necessary. In some cases, the use of non-aeronautical bands (e.g. licensed bands for cellular network) may be acceptable.	⁴ This ensures a minimum level of performance and is not limited to aeronautical licensed frequency bands (e.g. licensed bands for cellular network). Nevertheless, some operations may require the use of bands allocated to the aeronautical mobile service for the use of C2 link (e.g. 5030–5091 MHz). In any case, the use of licensed frequency bands needs authorisation.

TECHNICAL ISSUE WITH THE UAS		LEVEL of ASSURANCE		
		Low (SAIL II & III)	Medium (SAIL IV)	High (SAIL V & VI)
OSO #06 C3 link characteristics (e.g. performance, spectrum use) are appropriate for the UAS operation	Criterion #1 (Operator)	The UAS operator declares that the required level of integrity has been achieved.	The UAS operator should use a UAS for which EASA has verified the claimed integrity through a design verification report (DVR) issued following an application from the UAS designer.	The UAS operator should use a UAS for which EASA has issued a type certificate or restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012 following an application from the UAS designer.
	Comments	N/A	N/A	N/A

	Criterion #2 (Designer)	The UAS designer declares that the required level of integrity has been achieved. If the operation is classified as SAIL III, the UAS operator should use a UAS for which the UAS designer has issued a statement of declared with the MoC to OSO #06¹ using the form attached to the MoC.²	The UAS designer should obtain a design verification report (DVR) issued by EASA.	The UAS designer should obtain a type certificate or a restricted type certificate issued by EASA in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012.
	Comments	¹ https://www.easa.europa.eu/en/document-library/product-certification-consultations/means-compliance-moc-design-uas-operated-sail ² For UAS operations classified in SAIL II, the UAS operator may still use an UAS for which the UAS designer issued a statement of compliance with the MoC to OSO #6. However, the UAS designer should be allowed to experiment new solutions. In this case a statement of compliance not referring to a published MoC might be acceptable.	N/A	N/A

OSO #07 — Conformity check of the UAS configuration

- (a) The intent of this OSO is that the UAS operator assure that the UAS used for the operation conforms to the UAS data used to support the approval/authorisation of the UAS operation.
- (b) This OSO does not describe a pre- or post-flight inspection as part of normal operations; these are covered under OSO #8.

TECHNICAL ISSUE WITH THE UAS		LEVEL of INTEGRITY		
		Low (SAIL I & II)	Medium (SAIL III & IV)	High (SAIL V & VI)
OSO #07 Conformity check of the UAS configuration	Criterion	The operator has UAS conformity check procedures in place ensuring periodically that: (a) the UAS intended to be used for the operation is in a condition for safe operation; and (b) the UAS configuration conforms to the information contained in the UAS flight manual and to the authorised configuration ¹ .		
	Comments	¹ The allowed UAS configuration should be defined by the UAS designer according to the configuration control criteria as per OSO #2.		

TECHNICAL ISSUE WITH THE UAS		LEVEL of ASSURANCE		
		Low (SAIL I & II)	Medium (SAIL III & IV)	High (SAIL V & VI)
OSO #07 Conformity check of the UAS configuration	Criterion #1 (Procedures)	The UAS operator declares it has UAS conformity check procedures in place which take into consideration the UAS designer's recommendations, if available.	Same as 'low'. In addition, the UAS conformity checks are documented using checklists.	Same as 'medium'. In addition, the product inspection procedures are validated by the competent authority of the Member State or by an entity that is designated by the competent authority.
	Comments	N/A	N/A	N/A
	Criterion #2 (Training)	The UAS operator declares that the remote crew is trained to perform the UAS conformity check (with evidence available).	(a) A training syllabus, including a UAS conformity check procedure, is available. (b) The UAS operator provides evidence of the theoretical and practical training.	The competent authority of the Member State or an entity that is designated by the competent authority: (a) validates the training syllabus; and (b) verifies the remote crew competencies.
	Comments	N/A	N/A	N/A

OSO #08 — Operational procedures are defined, validated and adhered to

- (a) Operational procedures address normal, abnormal and emergency situations potentially resulting from technical issues with the UAS or from external systems supporting the UAS operation, human error or adverse environmental conditions.
- (b) Standard operational procedures are a set of instructions covering policies, procedures and responsibilities set out by the UAS operator that support operational personnel in ground and flight operations of the UA safely and consistently during normal situations.

- (c) Contingency procedures are designed to potentially prevent a significant future event (e.g. loss of control of the operation) that has an increased likelihood to occur due to the current abnormal state of the operation. These procedures should return the operation to a normal state and enable the return to using standard operational procedures or allow the safe cessation of the flight.
- (d) Emergency procedures are intended to mitigate the effect of failures that could cause or could lead to an emergency situation.
- (e) The emergency response plan (ERP) deals with the potential hazardous secondary or escalating effects following a loss of control of the operation (e.g. in the case of ground impact, mid-air collision or fly-away) and is decoupled from the emergency procedures as it does not deal with the control of the UA during operation.

OPERATIONAL PROCEDURES		LEVEL of INTEGRITY		
		Low (SAIL I)	Medium (SAIL II)	High (SAIL III to VI)
OSO #08 Operational procedures are defined, validated and adhered to	Criterion #1 (UAS flight manual)	The UAS designer develops a UAS flight manual, including the relevant information (e.g. limitations).		
	Comments	N/A		
	Criterion #2 (Procedure definition)	(a) The UAS operator develops operational procedures ¹ appropriate for the proposed operation, taking into account the relevant information (e.g. limitations) listed in the UAS flight manual and, as a minimum, cover the following elements: (1) Flight planning; (2) Pre- and post-flight inspections; (3) Procedures to evaluate the environmental conditions before and during the flight (i.e. real-time evaluation), including the assessment of meteorological conditions (METAR, TAF, etc.) with a simple recording system; (4) Procedures to cope with unexpected adverse operating conditions (e.g. when ice is encountered during an operation that is not approved for icing conditions); (5) Normal procedures; (6) Contingency procedures (to cope with abnormal situations); (7) Emergency procedures (to cope with emergency situations), including an ERP; (8) Pre-flight procedures, including briefing of any involved persons about the potential risks and actions to take in case the UA misbehaves; (9) Occurrence-reporting procedures; and (b) The limitations of the external systems supporting the UAS operation ² are defined in the OM.		

OPERATIONAL PROCEDURES		LEVEL of INTEGRITY		
		Low (SAIL I)	Medium (SAIL II)	High (SAIL III to VI)
	Comments	¹ Operational procedures cover the deterioration of the UAS itself and of any external system supporting the UAS operation. Please, refer to Part B of the OM example for UAS operations published on the EASA website at https://www.easa.europa.eu/en/downloads/139674/en. To properly address the deterioration of external systems required for the operation, it is recommended to: (a) identify these 'external systems'; (b) identify the modes of deterioration of the 'external systems' (e.g. complete loss of GNSS, GDOP/PDOP, latency issues, etc.) which would lead to a loss of control of the operation; (c) describe the means to detect these modes of deterioration of the external systems ; and (d) describe the procedure(s) to be used when deterioration is detected (e.g. activation of the emergency recovery capability, switch to manual control, etc.). ² In the scope of this assessment, external systems supporting the UAS operation are defined as systems that are not already part of the UAS but are used to: (a) launch / take off the UA; (b) make pre-flight checks; or (c) keep the UA within its operational volume (e.g. GNSS, satellite systems, air traffic management, U-space). External systems activated/used after a loss of control of the operation are excluded from this definition.		
	Criterion #3 (Consideration of potential human error)	As a minimum, operational procedures¹: (a) include a clear distribution and assignment of tasks, and (b) rely on checklists to ensure staff are adequately performing their assigned tasks.	Operational procedures take human error into consideration.	Same as 'medium'. In addition, the remote crew ³ receives crew resource management (CRM) ⁴ training.
	Comments	¹ Please, refer to Part B of the OM example published on the EASA website at https://www.easa.europa.eu/en/downloads/139674/en.	N/A	³ In the context of SORA, the term 'remote crew' refers to any person involved in the operation. ⁴ CRM training focuses on the effective use of all the remote crew to ensure safe and efficient operation, reducing error, avoiding stress and increasing efficiency.

OPERATIONAL PROCEDURES		LEVEL of INTEGRITY		
		Low (SAIL I)	Medium (SAIL II)	High (SAIL III to VI)
				Elements of the CRM training may be found in the AMC and GM to point ORO.FC.115 to Regulation (EU) No 965/2012.
	Criterion #4 (Emergency response plan (ERP))	The ERP: (a) is suitable for a given situation⁶; (b) effectively mitigates all anticipated hazardous secondary effects after the initial crash; (c) clearly delineates the duties of the remote crew member(s); (d) is practical to use and for training purposes, so that the remote crew can execute the procedures effectively under stress. The ERP contains as a minimum: (a) the list of anticipated emergency situations with secondary effects; (b) the procedures for each of the identified anticipated emergency situations (including criteria to identify each of these situations); (c) the list of relevant contacts to reach (e.g. ATC, police, fire brigade, first responders).		
	Comments	⁶ The ERP should be proportional to the potential secondary effects of a ground impact, i.e. those effects that may occur after the initial ground impact (e.g. fire, release of poisonous gas). AMC3 UAS.SPEC.030(3)(e) provides additional information. The ERP chapter of the OM published on the EASA website (https://www.easa.europa.eu/en/domains/drones-air-mobility/operating-drone/specific-category-civil-drones#group-easa-downloads) may be considered as a reference.		

OPERATIONAL PROCEDURES		LEVEL of ASSURANCE		
		Low (SAIL I)	Medium (SAIL II)	High (SAIL III to VI)
OSO #08, Operational procedures are defined, validated and adhered to	Criterion #1	The UAS operator should use a UAS for which the UAS designer has issued a statement of compliance with MoC to OSO #08¹ using the form attached to the MoC.		
				SAIL III same as SAIL I and II. SAIL IV: EASA has verified the claimed integrity through a design verification report (DVR) issued following an application from the UAS designer.

				SAIL V and VI: EASA has verified the claimed integrity through the issuance of a type certificate according with Annex I (Part 21) to Regulation (EU) No 748/2012 issued following an application from the UAS designer.
	Comments	https://www.easa.europa.eu/en/document-library/product-certification-consultations/means-compliance-moc-design-uas-operated-sail		N/A
	Criteria#2, #3 and #4	The UAS operator declares the adequacy of the operational procedures and the ERP. As a minimum, the emergency procedures are tested.	(a) Operational procedures and the ERP are developed according to AMC2 UAS.SPEC.030(3)(e) and AMC3 UAS.SPEC.030(3)(e) respectively. (b) The adequacy of the contingency and emergency procedures is proven through: (1) dedicated flight tests; or (2) simulation, provided that the representativeness of the simulation means is proven valid for the intended purpose with positive results; or (3) any other means acceptable to the competent authority.	Same as 'medium'. In addition: (a) Flight tests performed to validate the operational procedures and the checklists cover the complete flight envelope or are proven to be conservative. (b) The operational procedures, checklists, flight tests and simulations are validated by the competent authority of the Member State or by an entity that is designated by the competent authority. (c) The representativeness of the tabletop exercise¹ of the ERP is validated by the competent authority of the Member State or by an entity that is designated by the competent authority.
	Comments	Operational procedures do not require validation against either a standard or a means of compliance that is		¹ The tabletop exercise may involve the third parties identified in the ERP.

		<i>considered adequate by the competent authority.</i>	
	Alternative criteria #2, #3 and #4 taking credit for functional-test-based (FTB) methods	FUNCTIONAL-TEST-BASED (FTB) METHODS (for SAILs up to and including IV) If the UAS operator has evidence of the FTB flight hours proportionate to the risk/SAIL of the UAS operation meeting either set of conditions described either in Section E.3(c) or in Section E.3(d) and executed: (a) within the full operational scope/envelope intended by the UAS operator; and (b) following the operational procedures included in the operation manual, then the assurance that the operational procedures are adequate is fulfilled at the level corresponding to the SAIL being demonstrated by the FTB approach².	
	Comments	² As an example, if the number of test cycles supporting the FTB flight hours is proportionate to the risk of a SAIL III operation (i.e. 3 000 FH), the assurance level for OSO #08 is fulfilled at 'high' level.	

E.4 OSOs related to remote crew training

OSO #09 — Remote crew trained and current

- (a) The UAS operator needs to propose a theoretical and practical training that:
 - (1) is appropriate for the operation to be approved allowing the remote crew to control the normal, abnormal and emergency situations potentially resulting from technical issues with the UAS or from external systems supporting the UAS operation, human errors or adverse environmental conditions; and
 - (2) includes proficiency requirements and recurrent training.
- (b) The entire remote crew (i.e. any person involved in the operation) should receive theoretical and practical training specific to their duties (e.g. pre-flight inspection, ground equipment handling, evaluation of the meteorological conditions, etc.).

REMOTE CREW COMPETENCIES		LEVEL of INTEGRITY		
		Low (SAIL I & II)	Medium (SAIL III & IV)	High (SAIL V & VI)
OSO #09, Remote crew trained and current	Criterion	The theoretical and practical training: (a) ensures knowledge of: (1) the UAS Regulations; (2) airspace operating principles; (3) airmanship and aviation safety; (4) human performance limitations; (5) meteorology and assessment of meteorological conditions; (6) navigation/charts; (7) the UAS; (8) operational procedures and the ERP; and (9) the use of external services, including service limitations and system recovery, if any¹; (b) is adequate for the UAS operation, i.e. allows the remote crew to control the normal, abnormal and emergency situations potentially resulting from technical issues with the UAS or from external systems supporting the UAS operation, human errors or adverse environmental conditions^{2,3}; (c) specifies proficiency requirements and training recurrence.		
	Comments	¹ If external services are used, the UAS operator is responsible for using the services in the intended manner (e.g. as defined in a service level agreement) and ensuring that the remote crew is trained to use the services as intended. ² The details of the areas to be covered for the different subjects listed above are provided in AMC1 UAS.SPEC.050(1)(d) 'Theoretical knowledge subjects for the training of the remote pilot and all personnel in charge of duties essential to the UAS operation in the "specific" category', in AMC2 UAS.SPEC.050(1)(d) 'Practical-skill training of the remote pilot and all personnel in charge of duties essential to the UAS operation in the "specific" category' and in AMC3 UAS.SPEC.050(1)(d) 'UAS operation-specific endorsement modules'. ³ The distinction between a low, a medium and a high level of robustness for this criterion is achieved through the level of assurance (see table below).		

REMOTE CREW COMPETENCIES		LEVEL of ASSURANCE		
		Low (SAIL I & II)	Medium (SAIL III & IV)	High (SAIL V & VI)
OSO #09, Remote crew trained and current	Criterion	Training is self-declared (with evidence available).	(a) The training syllabus is available and kept up to date. (b) Evidence of the theoretical and practical training is available.	The competent authority of the Member State or an entity that is designated by the competent authority: (a) validates the training syllabus; and (b) verifies the remote crew competencies.
	Comments	N/A	N/A	N/A

OSO #13 — External services supporting UAS operations are adequate for the UAS operation

For the purpose of the SORA and this specific OSO, the term ‘external services supporting UAS operations’ encompasses any service providers necessary for the safety of the flight¹, such as:

- communication service providers;
- navigation service providers (e.g. GNSS);
- U-space service providers;
- externally provided electrical power (e.g. in the case where no emergency backup generator is available and the safety of the flight is dependent on continuous power supply).

The interface between the UAS operator and the external service provider(s) may take the form of a service level agreement (SLA) or a similar document.

DETERIORATION OF EXTERNAL SYSTEMS SUPPORTING UAS OPERATIONS		LEVEL of INTEGRITY		
		Low (SAIL I & II)	Medium (SAIL III)	High (SAIL IV to VI)
OSO #13 External services supporting UAS	Criterion	The UAS operator ensures that the level of performance for any externally provided service necessary for the safety of the flight ¹ is adequate for the UAS operation. If the externally provided service requires communication between the UAS operator and the service provider, the UAS operator ensures there is effective communication to support the service provision.		

DETERIORATION OF EXTERNAL SYSTEMS SUPPORTING UAS OPERATIONS		LEVEL of INTEGRITY		
		Low (SAIL I & II)	Medium (SAIL III)	High (SAIL IV to VI)
operations are adequate for the UAS operation		Roles and responsibilities between the UAS operator and the external service provider are defined.		
	Comments	¹ A service whose loss would directly lead to a loss of control of the operation as identified per OSO #05.		
	Comments	N/A	N/A	Requirements for contracting services with the service provider(s) may be derived from ICAO Standards and Recommended Practices (SARPs) that are currently under development.

DETERIORATION OF EXTERNAL SYSTEMS SUPPORTING UAS OPERATIONS		LEVEL of ASSURANCE		
		Low (SAIL I & II)	Medium (SAIL III)	High (SAIL IV to VI)
OSO #13 External services supporting UAS operations are adequate for the UAS operation	Criterion	The UAS operator declares ¹ that the requested level of performance for any externally provided service necessary for the safety of the flight is achieved.	The UAS operator has supporting evidence that the required level of performance for any externally provided service required for the safety of the flight can be achieved for the full duration of the operation. This may take the form of a service-level agreement (SLA) or any official commitment that prevails between a service provider and the UAS operator on the relevant aspects of the service (including quality, availability, and responsibilities). The UAS operator has a means to monitor externally provided services which affect flight-critical systems and takes appropriate actions if real-time performance could lead to the loss of control of the operation.	Same as 'medium'. In addition: (a) the evidence of the performance of an externally provided service is achieved through demonstrations; and (b) the competent authority of the Member State or an entity that is designated by the competent authority validates the claimed level of integrity.
	Comments	¹ Supporting evidence for this declaration may still be	N/A	N/A

		requested by the competent authority. Supporting evidence may take the form of a service level agreement (SLA) or any official commitment that prevails between a service provider and the UAS operator on relevant aspects of the service (including quality, availability and responsibilities). As an example, if a UAS operator uses an external surveillance service, it should have evidence available supporting the claim that the service meets the performance requirements of Annex D to this AMC.		

OSO #16 — Multi-crew coordination

This OSO applies only to those personnel directly involved in the flight operation.

MULTI-CREW COORDINATION		LEVEL of INTEGRITY		
		Low (SAIL I & II)	Medium (SAIL III & IV)	High (SAIL V & VI)
OSO #16 Multi-crew coordination	Criterion #1 (Procedures)	The UAS operator develops procedures to ensure coordination between the crew members, and robust and effective communication channels are available and as a minimum cover: (a) assignment of tasks to the crew; and (b) establishment of step-by-step communications, including the establishment and use of proper phraseology between the remote crew members involved in the aerial part of the operation.¹		

	Comments	¹ The distinction between a low, a medium and a high level of robustness for this criterion is achieved through the level of assurance (see the table below).		
	Criterion #2 (Training)	Remote crew training covers multi-crew coordination	Same as 'low'. In addition, the remote crew ² receives CRM ³ training.	Same as 'medium'.
	Comments	N/A	² In line with definition I.110 'Remote pilot (in command)' provided in Annex I to this AMC, the term 'remote crew' refers to any person that performs duties essential to the safety of flight (e.g. AOs, UA observers). ³ CRM training focuses on the effective use of all the remote crew to assure a safe and efficient operation, reducing error, avoiding stress and increasing efficiency.	N/A
	Criterion #3 (Communication devices)	N/A	The UAS operator determines that the performance of communication devices is adequate to safely conduct the UAS operation. The remote crew has the means to check the performance of the communication devices at intervals deemed appropriate to ensure the performance continues to meet the operational requirements throughout the operation.	Same as 'medium'. In addition, communication devices are redundant ⁴ and comply with standards considered adequate by the competent authority and/or in accordance with a means of compliance acceptable to that authority.
	Comments	N/A	N/A	⁴ This implies the provision of an extra device to cope with the failure of the first device.

HUMAN ERROR		LEVEL of ASSURANCE		
		Low (SAIL I & II)	Medium (SAIL III & IV)	High (SAIL V & VI)
OSO #16 Multi-crew coordination	Criterion #1 (Procedures)	(a) Procedures do not require validation against either a standard or a means of compliance considered adequate	(a) Procedures are validated against standards considered adequate by the competent authority of the Member State and/or in accordance with means of compliance acceptable to that authority ¹ .	Same as 'medium'. In addition: (a) flight tests performed to validate the procedures cover the complete flight envelope or are proven to be conservative; and

HUMAN ERROR		LEVEL of ASSURANCE		
		Low (SAIL I & II)	Medium (SAIL III & IV)	High (SAIL V & VI)
		by the competent authority of the Member State. (b) The adequacy of the procedures and checklists is declared.	(b) The adequacy of the procedures is proven through: (1) dedicated flight tests; or (2) simulation, provided that the representativeness of the simulation means is proven valid for the intended purpose with positive results; or (3) any other means acceptable to the competent authority.	(b) the procedures, flight tests and simulations are validated by the competent authority of the Member State or an entity designated by the competent authority.
	Comments	N/A	¹ AMC2 UAS.SPEC.030(3)(e) ('Operational procedures for medium and high levels of robustness') is considered an acceptable means of compliance.	N/A
	Alternative criterion #1 taking credit for functional-test-based (FTB) methods	FUNCTIONAL-TEST-BASED (FTB) METHODS (for SAILs up to and including IV): If the UAS operator has evidence of the FTB flight hours proportionate to the risk/SAIL of the operation meeting either set of conditions described either in Section 3(c) or in Section 3(d) and executed: — within the full operational scope/envelope intended by the UAS operator; and — following the operational procedures referred to in the operational authorisation, then the assurance that the operational procedures are adequate is fulfilled at the level corresponding to the SAIL being demonstrated by the FTB approach ² .		N/A ³
	Comments	² As an example, if the number of test cycles supporting the FTB flight hours is proportionate to the risk of a SAIL III operation (i.e. 3 000 FH), the assurance level for OSO #16 Criterion #1 is fulfilled at 'medium' level.		³ FTB methods are not considered feasible for operations with a SAIL V or VI.
	Criterion #2 (Training)	Training is self-declared (with evidence available).	(a) Training syllabus is available. (b) Evidence of the theoretical and practical training is available.	The competent authority of the Member State or an entity that is designated by the competent authority: (a) validates the training syllabus; and (b) verifies the remote crew competencies.

HUMAN ERROR		LEVEL of ASSURANCE		
		Low (SAIL I & II)	Medium (SAIL III & IV)	High (SAIL V & VI)
	Comments	N/A	N/A	N/A
	Criterion #3 (Communication devices)	N/A	The UAS operator has supporting evidence that the required level of integrity is achieved. This is typically done by testing, analysis, simulation ¹ , inspection, design review or through operational experience.	Unless the communication device is included in the UAS type design, the competent authority or an entity that is designated by the competent authority validates the claimed level of integrity.
	Comments	N/A	¹ When simulation is performed, the validity of the targeted environment that is used in the simulation needs to be justified.	N/A

OSO #17 — Remote crew is fit to operate

- (a) For the purpose of SORA, the expression ‘fit to operate’ should be interpreted as physically and mentally fit to perform their duties and safely discharge their responsibilities.
- (b) Fatigue and stress are contributing factors to human error. Therefore, to ensure that vigilance is maintained at a satisfactory level of safety, consideration may be given to the following:
 - (1) remote crew workload and duty times;
 - (2) regular breaks;
 - (3) rest periods;
 - (4) personal protective equipment (PPE)¹;
 - (5) workplace environment, including ergonomics of the workstation², and
 - (6) handover/takeover procedures.

¹ In accordance with national occupational safety and health regulations.

² In accordance with national occupational safety and health regulations.

HUMAN ERROR		LEVEL of INTEGRITY		
		Low (SAIL I & II)	Medium (SAIL III & IV)	High (SAIL V & VI)
OSO #17 Remote crew is fit to operate	Criterion	The UAS operator has a policy defining the criteria ¹ and the means on how the remote crew can declare themselves fit to operate before starting their duty, and on how to report themselves unfit, if required, during their shift.	Same as 'low'. In addition: — Duty, flight duty and resting times for the remote crew are defined by the UAS operator and are adequate for the operation. — The UAS operator defines requirements appropriate for the remote crew to operate the UAS.	Same as 'medium'. In addition: — The remote crew is medically fit. — A fatigue risk management system (FRMS) is in place to manage any escalation in duty/flight duty times.
	Comments	¹ Criteria should take into account national legislation and may cover drugs (including prescriptions) and alcohol consumption.	N/A	N/A

HUMAN ERROR		LEVEL of ASSURANCE		
		Low (SAIL I & II)	Medium (SAIL III & IV)	High (SAIL V & VI)
OSO #17 Remote crew is fit to operate	Criterion	The policy defining the criteria and the means for the remote crew to declare themselves fit to operate before starting their duty and to report themselves unfit, if required, during their shift is documented.	Same as 'low'. In addition: (a) Remote crew duty, flight duty and the resting time policy are documented. (b) Remote crew duty cycles are logged and cover as a minimum: (1) when the remote crew members' duty day commences; (2) when the remote crew members are free from duties; and (3) resting times within the duty cycle.	Same as 'medium'. In addition: (a) Medical standards considered adequate by the competent authority and/or the means of compliance acceptable to that authority are established and the competent authority of the Member State or an entity that is designated by the competent authority verifies that the remote crew is medically fit. (b) The competent authority of the Member State or an entity that is designated by the competent authority validates the duty/flight duty times. The FRMS is validated by the competent authority of the Member State or by an entity that is designated by the competent authority

				and internally monitored by the UAS operator.
	Comments	N/A	N/A	N/A

OSO #18 — Automatic protection of the flight envelope from human errors

- Each UA is designed with a flight envelope that describes its safe performance limits with regard to relevant flight parameters such as minimum and maximum operating speeds, and its operating structural strength.
- Automatic protection of the flight envelope is intended to prevent the remote pilot from operating the UA outside its flight envelope. If the UAS operator demonstrates that the remote pilot is not in the loop, this OSO is not applicable.
- A UAS implementing such an automatic protection function will ensure that the UA is operated within an acceptable flight envelope margin even in the case of incorrect remote-pilot control inputs (human errors).
- UAS without automatic protection functions are susceptible to incorrect remote-pilot control inputs (human errors), which can result in the loss of the UA if the designed performance limits of the UA are exceeded.
- Failures or development errors of the flight envelope protection are addressed in OSO #5.

HUMAN ERROR		LEVEL of INTEGRITY		
		Low (SAIL III)	Medium (SAIL IV)	High (SAIL V & VI)
OSO #18 Automatic protection of the flight envelope from human errors	Criterion	The UAS flight control system incorporates automatic protection of the flight envelope to prevent the remote pilot from making any <u>single</u> input under <u>normal operating conditions</u> that would cause the UA to exceed its flight envelope or prevent it from recovering in a timely fashion.	The UAS flight control system incorporates automatic protection of the flight envelope to ensure the UA remains within the flight envelope or ensures a timely recovery to the designed operational flight envelope <u>following remote-pilot error(s)</u> . ^{1,2}	
	Comments	N/A	¹ The distinction between a medium and a high level of robustness for this criterion is achieved through the level of assurance (see table below). ² Compared to the low level of robustness, medium and high levels need to address any operating conditions (normal, abnormal and emergency) and the potential for multiple errors.	

HUMAN ERROR	LEVEL of ASSURANCE

		Low (SAIL III)	Medium (SAIL IV)	High (SAIL V & VI)
OSO #18 Automatic protection of the flight envelope from human errors	Criterion	The UAS designer develops the automatic protection of the flight envelope in-house or out of the box (e.g. using commercial off-the-shelf elements), without following specific standards. The UAS operator should use a UAS for which the UAS designer has issued a statement of compliance with the MoC to OSO #18¹ using the form attached to the MoC.	The UAS operator should use a UAS for which EASA has verified the claimed integrity through a design verification report (DVR) issued following an application from the UAS designer.	The UAS operator should use a UAS for which EASA has issued a type certificate or a restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012 following an application from the UAS designer.
	Comments	¹ https://www.easa.europa.eu/en/document-library/product-certification-consultations/means-compliance-moc-design-uas-operated-sail	N/A	N/A

OSO #19 — Safe recovery from human error

- (a) This OSO addresses the risk of human errors which may affect the safety of the operation if not prevented or detected and recovered in a timely fashion.
 - (i) Errors can be made by anyone involved in the operation.
 - (ii) An example could be a human error leading to the incorrect loading of the payload, with the risk of it falling off the UA during the operation.
 - (iii) Another example could be a human error not to extend the antenna mast, thus reducing the C2 link coverage.

Note: The flight envelope protection is excluded from this OSO since it is specifically covered by OSO #18.
- (b) This OSO covers the UAS design, i.e. systems detecting and/or recovering from human errors (e.g. safety pins, use of acknowledgment features, fuel or energy consumption monitoring functions, etc.).
- (c) Operational procedures and training are covered in OSO #08 and OSO #09 respectively.

HUMAN ERROR		LEVEL of INTEGRITY		
		Low (SAIL III)	Medium (SAIL IV & V)	High (SAIL VI)
OSO #19 Safe recovery from human error	Criterion	Systems detecting and/or recovering from human errors are developed according to industry best practices.	Systems detecting and/or recovering from human errors are developed to standards considered adequate by the competent authority and/or in accordance with a means of compliance acceptable to that authority.	Same as 'medium'.
	Comments	N/A	N/A	N/A

HUMAN ERROR		LEVEL of ASSURANCE		
		Low (SAIL III)	Medium (SAIL IV & V)	High (SAIL VI)
OSO #19 Safe recovery from human error	Criterion	The UAS designer declares that the required level of integrity has been achieved. The UAS operator should use a UAS for which the UAS designer has issued a statement of compliance with MoC to OSO #19/#20 ¹ using the form attached to the MoC.	The UAS designer has supporting evidence that the required level of integrity is achieved. That evidence is provided through testing, analysis, simulation ² , inspection, design review or operational experience. If the operation is classified as SAIL IV, the UAS operator should use a UAS for which EASA has verified the claimed integrity through a design verification report (DVR) issued following an application from the UAS designer. If the operation is classified as SAIL V, the UAS operator should use a UAS for which EASA has issued a type certificate or a restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012 following an application from the UAS designer.	The UAS operator should use a UAS for which EASA has issued a type certificate or a restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012 following an application from the UAS designer.
	Comments	¹ https://www.easa.europa.eu/en/document-library/product-certification-consultations/means-compliance-moc-design-uas-operated-sail	² When simulation is performed, the validity of the targeted environment that is used in the simulation needs to be justified.	N/A

OSO #20 — A human factors evaluation has been performed and the HMI has been found appropriate for the intended UAS operation

HUMAN ERROR		LEVEL of INTEGRITY		
		Low (SAIL II & III)	Medium (SAIL IV & V)	High (SAIL VI)
OSO #20 A human factors evaluation has been performed and the HMI has been found appropriate for the intended UAS operation	Criterion	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	<i>If an electronic means is used to support the remote crew members in their role to maintain awareness of the position of the unmanned aircraft, its HMI:</i> — <i>is sufficient to allow the remote crew members to determine the position of the UA during operation; and</i> — <i>does not degrade the remote crew members' ability to:</i> — <i>scan the airspace visually where the unmanned aircraft is operating for any potential collision hazard; and</i> — <i>maintain effective communication with the remote pilot at all times.</i>		

HUMAN ERROR		LEVEL of ASSURANCE		
		Low (SAIL II & III)	Medium (SAIL IV & V)	High (SAIL VI)
OSO #20 A human factors evaluation has	Criterion	The UAS designer conducts a human factors evaluation of the UAS to determine whether the HMI is appropriate for the	Same as 'low' but the HMI evaluation is based on demonstration or simulations. ¹	Same as 'medium'. In addition, the UAS operator should use a UAS for which EASA has issued a type certificate or a

been performed and the HMI has been found appropriate for the intended UAS operation		intended UAS operation. The HMI evaluation is based on inspection or analyses. The adequacy of the result of the HMI evaluation is declared. The UAS operator should use a UAS for which the UAS designer has issued a statement of compliance with MoC to OSO #19/#20¹ using the form attached to the MoC.	For operations classified in SAIL IV, the UAS operator should use a UAS for which EASA has issued a design verification report (DVR) following an application from the UAS designer. For operations classified in SAIL V, the UAS operator should use a UAS for which EASA has issued a type certificate or a restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012 following an application from the UAS designer.	restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012 following an application from the UAS designer.
	Comments	¹ https://www.easa.europa.eu/en/document-library/product-certification-consultations/mean	¹ When simulation is performed, the validity of the targeted environment that is used in the simulation needs to be justified.	N/A
	Alternative criterion for taking credit for functional-test-based (FTB) methods	If the UAS designer has evidence of the FTB flight hours proportionate to the risk/SAIL of the operation meeting either set of conditions described either in Section 3(c) or in Section 3(d) and executed: (a) within the full operational scope/envelope intended by the UAS operator; and (b) following the operational procedures and the remote crew training referred to in the operational authorisation, then the assurance that the operational procedures are adequate is fulfilled at the level corresponding to the SAIL being demonstrated by the FTB approach².	N/A	
	Comments	² As an example, if the number of test cycles supporting the FTB flying hours is proportionate to the risk of a SAIL III	N/A	

		operation (i.e. 3 000 FH), the assurance level for OSO #20 is fulfilled at 'low' level.	

OSO #23 — Environmental conditions for safe operations are defined, measurable and adhered to

ADVERSE OPERATING CONDITIONS		LEVEL of INTEGRITY		
		Low (SAIL I & II)	Medium (SAIL III & IV)	High (SAIL V & VI)
OSO #23 Environmental conditions for safe operations are defined, measurable and adhered to	Criterion	The environmental conditions for safe operations are defined and reflected in the UAS flight manual or equivalent document ¹ .		
	Comments	¹ The distinction between a low, a medium and a high level of robustness for this criterion is achieved through the level of assurance (see table below). For SAL III, compliance with the EASA MoC to OSO #24 already determines compliance with OSO #23. Refer to OSO #24.		

ADVERSE OPERATING CONDITIONS		LEVEL of ASSURANCE		
		Low (SAIL I & II)	Medium (SAIL III & IV)	High (SAIL V & VI)
OSO #23 Environmental conditions for safe operations are defined, measurable and adhered to	Criterion #1 (Definition)	The UAS designer declares that the required level of integrity has been achieved.	The UAS designer has supporting evidence that the required level of integrity is achieved. This is typically done by testing, analysis, simulation, inspection, design review or through operational experience. If the operation is classified as SAIL IV, the UAS operator should use a UAS for which EASA has issued a design verification report (DVR) following an application from the UAS designer.	The UAS operator should use a UAS for which EASA has issued a type certificate or a restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012 following an application from the UAS designer.
	Comments	N/A		

OSO #24 — The UAS is designed and qualified to operate in adverse environmental conditions (e.g. UA controllability and performance, adequate sensors, DO-160 qualification)

- (a) To assess the integrity of this OSO, the UAS designer determines:
- (1) whether credit can be taken for the equipment environmental qualification tests / declarations, e.g. by answering the following questions:
 - (i) Is there a Declaration of Design and Performance (DDP) available to the UAS designer stating the environmental qualification levels to which the equipment was tested?
 - (ii) Did the environmental qualification tests follow a standard considered adequate by the competent authority (e.g. DO-160)?
 - (iii) Are the environmental qualification tests appropriate and sufficient to cover all the environmental conditions related to the ConOps?
 - (iv) If the tests were not performed following a recognised standard, were the tests performed by an organisation/entity that is qualified or that has experience in performing DO-160-like tests?
 - (2) Can the suitability of the equipment for the intended/expected UAS environmental conditions be determined from either in-service experience or relevant test results?
 - (3) Any environmental limitations which, if exceeded, would compromise the suitability of the equipment or the operability or controllability of the UA (e.g. maximum cross wind).
- (b) The lowest integrity level should be considered for those cases where a UAS equipment has only a partial environmental qualification and/or a partial demonstration by similarity and/or parts with no qualification at all.

ADVERSE ENVIRONMENTAL CONDITIONS		LEVEL of INTEGRITY		
		N/A	Medium (SAIL III)	High (SAIL IV to VI)
OSO #24 The UAS is designed and qualified to operate in adverse environmental conditions	Criterion	N/A	The UAS is designed to limit the effect of the environmental conditions defined and reflected in the UAS flight manual.	The UAS is designed according to environmental standards considered adequate by the competent authority and/or in accordance with a means of compliance acceptable to EASA.
	Comments	N/A	<i>As an example, if a UAS is proposed to be operated in raining conditions, it is not necessary to comply with DO-160G waterproof conditions; the rain threshold may be limited as long as it is representative of the envisaged environmental conditions.</i>	N/A

ADVERSE OPERATING CONDITIONS		LEVEL of ASSURANCE		
		N/A	Medium (SAIL III)	High (SAIL IV to VI)
OSO #24 The UAS is designed and qualified to operate in adverse environmental conditions	Criterion	N/A	The UAS designer has supporting evidence that the required level of integrity has been achieved. This is typically done by testing, analysis, simulation¹, inspection, design review or through operational experience. The UAS operator should use a UAS for which the UAS designer has issued a statement of compliance with the MoC to OSO #24² using the form attached to the MoC.	If the operation is classified as SAIL IV, the UAS operator should use a UAS for which EASA has issued a design verification report (DVR) following an application from the UAS designer. If the operation is classified as SAIL V or VI, the UAS operator should use a UAS for which EASA has issued a type certificate or a restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012 following an application from the UAS designer.
	Comments	N/A	¹ When simulation is performed, the validity of the targeted environment that is used in the simulation needs to be justified. ² https://www.easa.europa.eu/en/document-library/product-certification-consultations/means-compliance-moc-design-uas-operated-sail	N/A
	Alternative criterion	N/A	FUNCTIONAL-TEST-BASED (FTB) METHODS: If the UAS designer has evidence of the FTB flight hours proportionate to the SAIL of the operation meeting either set of conditions described either in Section E.3(c) or in Section E.3(d) and executed (a) within the full operational scope/envelope intended by the UAS operator; and (b) following the maintenance instructions, the operational procedures and the remote	N/A

ADVERSE OPERATING CONDITIONS		LEVEL of ASSURANCE		
		N/A	Medium (SAIL III)	High (SAIL IV to VI)
			crew training referred to in the operational authorisation, then the assurance that the operational procedures are adequate is fulfilled at the level corresponding to the SAIL being demonstrated by the FTB approach ¹ .	
	Comments	N/A	¹ As an example, if the number of test cycles supporting the FTB flight hours is proportionate to the risk of a SAIL III operation (i.e. 3 000 FH), the assurance level for OSO #24 is fulfilled at 'medium' level.	N/A

E.3 Functional-test-based (FTB) approach

- (a) The objective of this section is to give some insight into the FTB approach referenced throughout Annex E to this AMC. This is articulated around three different but complementary perspectives:
- (1) FTB as a means of compliance (MoC) to support **UAS designers** in demonstrating UAS operational reliability for the purpose of obtaining an FTB design appraisal;
 - (2) FTB design appraisal performed by UAS designers supporting **UAS operators** when showing compliance with some of the OSOs of Annex E to this AMC;
 - (3) FTB as a means for **UAS operators** to take credit for safe and successful operations over time to expand their operational authorisation (based on the concept of 'reliability growth model').

These three approaches are detailed in the following points (b), (c) and (d).

- (b) For FTB as a MoC to support **UAS designers** in demonstrating UAS operational reliability, please refer to the EASA MoC SC Light-UAS FTB¹.
- (c) FTB design appraisal performed by UAS designers supporting **UAS operators** when showing compliance with some of the OSOs of Annex E to this AMC:

¹ <https://www.easa.europa.eu/en/document-library/product-certification-consultations/final-means-compliance-special-condition-light>

- (1) An FTB design appraisal obtained by a UAS designer presents several benefits both for the UAS operator going through the operational authorisation process and the competent authority issuing such operational authorisation, in particular when the UAS operator does not have a strong cooperation with the UAS designer or does not have all the design details.
- (2) In order for a UAS operator to take credit for an FTB design appraisal obtained by a UAS designer, the following conditions as a minimum should be met:
 - (i) The functional tests supporting the FTB design appraisal obtained by the UAS designer have been performed within the full operational scope/envelope intended by the UAS operator; this means that the test cycles are fully representative of the UAS operator's operations with test points to verify safe operation at the operational limits and corners of the UA envelope.
 - (ii) The functional tests supporting the FTB design appraisal obtained by the UAS designer have been performed following the operational procedures and the remote crew training referred to in the operational authorisation (and meeting the integrity assurance of the associated OSOs).
 - (iii) The UAS operator's maintenance instructions are established based on the UAS designer's instructions and requirements which were used for maintenance, repair or replacement of the UAS subsystems during the functional tests supporting the FTB design appraisal obtained by the UAS designer.
 - (iv) Any UAS configuration differences compared to the initial configuration used by the UAS designer to obtain the FTB design appraisal are confirmed by the UAS designer in order not to impair the validity of the FTB design appraisal.
 - (v) The minimum number of test cycles are proportionate to the risk of the UAS operation, with at least:
 - 30 hours for SAIL I;
 - 300 hours for SAIL II; and
 - 3 000 hours for SAIL IIIin order to achieve a 95 % confidence (assuming a binomial/Poisson distribution for the operational level hazard rate and no failures during the test)¹.Note that FTB methods are not considered feasible for UAS operations with a SAIL above or equal to IV.

¹ See the Rule of Three at [https://en.wikipedia.org/wiki/Rule_of_three_\(statistics\)](https://en.wikipedia.org/wiki/Rule_of_three_(statistics)).

- (vi) The functional tests supporting the FTB design appraisal obtained by the UAS designer have been performed by the UAS designer according to the principles/standards considered adequate by the competent authority in charge of granting the operational authorisation, including as a minimum the following principles:
 - The functional tests supporting the FTB design appraisal obtained by the UAS designer have been performed using an acceptable sample size of the UA.
 - Safe life limits for UAS subsystems sensitive to wear-out conditions based on the maximum cycles and hours demonstrated by one or more fleet leader UAS (i.e. the UAS with the longest time and/or cycles compared to other UAS used during the FTB testing) have been derived by the UAS designer and captured in the FTB design appraisal limitations.
- (3) Additionally, induced-failure tests may help demonstrate compliance with the following OSOs and Step #8:
 - (i) OSO #05 and Step #8: safety and reliability/safe design (e.g. induced-failure tests with no loss of control or containment as pass–fail criteria);
 - (ii) OSO #06: C3 link performance appropriate for the UAS operation (e.g. if the distance from a C2 radio transmitter/receiver is a critical factor, then the demonstration of the maximum allowable range from the transmitter/receiver in the most likely worst-case conditions is required);
 - (iii) OSO #18: Automatic protection of the flight envelope from human error.

However, induced-failure testing is not addressed in this version of Annex E to this AMC since competent authorities are still in the process of defining the modalities of test-based approaches. In the meantime, credit for induced-failure testing may be proposed on a case-by-case basis by a UAS operator depending on the scope of the FTB design appraisal obtained by the UAS designer.

- (d) FTB as a means for **UAS operators** to take credit for safe and successful operations over time to expand their operational authorisation (based on the concept of ‘reliability growth model’):
 - (1) An FTB approach should also allow UAS operators to take credit for safe and successful operations over time to expand their operational authorisation based on the concept of ‘reliability growth’, while still meeting the conditions of point E.3(c).
 - (2) UAS operators should be able to operate with a low SAIL approval and then, through operational experience, gather sufficient operational data to justify an increase in the SAIL, based upon the increase in operational reliability demonstrated by UAS operators. This approach would only be valid under representative operating conditions, not requiring additional strategic or tactical mitigations.

Note 1: The competent authority may accept accumulation of FTB hours between operators if the UAS configuration, operational procedures, training, etc., are demonstrated to be equivalent.

Note 2: This option does not cover expanded operating conditions which would require additional testing and/or analysis to be performed by the UAS designer. As an example, a UAS operator may start with a SAIL II operational authorisation to fly over population density up to 500 people/km² and, if they demonstrate 3 000 hours with no loss of control, they could be allowed to fly a SAIL III operation under the exact same operating conditions, except for an increase of the maximum population density allowed (5 000 people/km²).

- (3) To be relevant, the UAS operator would need to show that:
- (i) the next population band does not introduce new or unique hazards, or if it does, these new or unique hazards are shown to be properly mitigated through test or analysis;
 - (ii) the reliability demonstrated through operational testing demonstrates the required operational reliability at the higher SAIL level desired;
 - (iii) any UAS configuration differences compared to the initial configuration do not impair the validity of the argument.

E.4 Containment requirements

- (a) Section S.4.8 of this AMC (SORA Main Body, Step #8) ‘Determination of the containment requirements’ addresses the risk posed by an operational loss of control that could infringe on areas adjacent to the operational volume and buffers. The ground risk (in the adjacent ground area) determines the level of safety requirements to be met by containment design features and operational procedures.
- (b) The following section provides the generic containment requirements for the following three levels of containment: low, medium and high.

Containment of untethered UA	LEVEL of INTEGRITY		
	Low	Medium	High
Criterion #1 (Operational volume containment)	UAS should be designed such that: — (qualitative) no probable ¹ single failure of the UAS or of any external system supporting the operation could lead to operation outside the operation volume; OR — (quantitative) the probability of the failure condition ‘UA leaving the operational volume’ should be less than 10 ⁻³ /FH.		The UAS should be designed such that: — (qualitative) no remote single failure ³ of the UAS or of any external system supporting the operation could lead to operation outside the operational volume; OR — (quantitative) the probability of the failure condition ‘UA leaving the operational volume’ should be less than 10 ⁻⁴ /FH ⁴ .

Comments	¹ Failures anticipated to occur one or more times during the entire operational life of an item.	² This may be achieved by a tether that prevents the UA from exiting the operational volume (see containment of tethered UA below). ³ 'failure' needs to be understood as an occurrence that affects the operation of a component, part or element such that it can no longer function as intended. Errors may cause failures but are not considered failures. Some structural or mechanical failures may be excluded from the criterion if it can be shown that such structural or mechanical parts were designed according to aviation industry best practices. ³ Failures unlikely to occur with each UA during its operational life but that may occur several times when considering the total operational life of a number of UA of a particular type. ⁴ This means a reduction by a factor of 10 of the likelihood of exiting the operational volume compared to the 'low' and 'medium' integrity containment.
Criterion #2 (End of flight upon exit of the operational volume)	When the UA leaves the operational volume, the immediate termination of the flight should be initiated through a combination of procedures/processes and/or available technical means.	
Comments	Such criteria may be satisfied by the operational procedures developed by the UAS operator that may rely (fully or partially, depending on the level of automation of the UAS) on technical means developed by the UAS designer and documented in the UAS flight manual.	
Criterion #3 (Definition of the final ground risk buffer)	The UAS operator defines the size of the ground risk buffer. In principle, the ground risk buffer should at least adhere to the 1:1 principle⁵. Alternatively, as the 1:1 rule may not be suitable for some UA configurations (e.g. fixed-wing or parachute-equipped UA), the competent authority may require	In addition to 'low' robustness, the ground risk buffer should consider the following points: (a) Probable⁷ single failures (including the projection of high-energy parts such as rotors and propellers) which would lead to an operation outside the operational volume; (b) Meteorological conditions (e.g. maximum sustained wind); (c) UAS latencies (e.g. latencies that affect the timely manoeuvrability of the UA); (d) UA behaviour when activating a technical containment measure considering UA performance.

	defining the ground risk buffer based on a ballistic methodology approach, a glide trajectory⁶, representative flight tests and/or a combination of these. A smaller ground risk buffer value may be proven by the UAS operator for a rotary-wing UA using a ballistic methodology approach acceptable to the competent authority. If the UAS uses a parachute, the UAS operator should consider the effect of wind on the UAS when it is deployed.	
Comments	⁵ The 1:1 principle refers to applying a ground risk buffer that is as wide as the maximum height of the operational volume. For the evaluation of the size of the ground risk buffer based on the 1:1 principle, see Annex A Section A.5.2.4. ⁶ See Annex A Section A.5.2.4.	⁷ For the purpose of this assessment, the term ‘probable’ should be interpreted in a qualitative way as ‘anticipated to occur one or more times during the entire operational life of a UAS’.
Criterion #4 (Ground risk buffer containment)	N/A	The UAS should be designed such that no single failure⁸ of the UAS or of any external system supporting the operation could lead to operation outside the ground risk buffer. 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 recognised as adequate by the competent authority.
Comments	N/A	⁸ Example methods for achieving this may include: — an independent flight termination system (FTS) that will initiate the end of the flight when the UA exits the operational volume; or — a secondary independent emergency flight control system that ends the flight in a controlled manner without exceeding the ground risk buffer; or — a tether that prevents the UA from exiting the ground risk buffer.

Containment of untethered UA	LEVEL of ASSURANCE		
	Low	Medium	High
For all criteria	The applicant declares¹ that the required level of integrity has been achieved. The UAS designer: (a) for <u>criteria #1</u>, conducts a design and installation appraisal² including as a minimum: — design and installation features (e.g. independence, separation or redundancy claims); — any relevant particular risk (e.g. hail, ice, snow, electromagnetic interference, etc.) associated with the UAS operation and how they are being addressed; (b) for <u>criteria #2</u>, tests the technical means to safely end the flight and includes the procedures in the UAS flight manual. The UAS operator: — for <u>criteria #2</u>, tests the adequacy of the emergency procedures to terminate the flight.	The applicant has supporting evidence that the required level of integrity has been achieved. This is typically done by testing, analysis, simulation², inspection and design review. Among the supporting evidence: (a) for <u>criteria #1 and criteria #4</u>: same as criteria #1, 'low'; (b) for <u>criteria #2</u>: the adequacy of the emergency procedures to terminate the flight is proven through: — dedicated flight tests; or — simulation provided the simulation is proven valid for the intended purpose with positive results.	Same as 'medium'. The UAS operator should use a UAS for which EASA has verified the claimed integrity through a design verification report 'DVR'. In addition, the competent authority of the Member State or the entity that is designated by the competent authority validates the claimed level of integrity for the non-design-related criteria.
Comments	¹ Supporting evidence for this declaration may still be requested by the competent authority.	² When simulation is used, the suitability of the targeted environment used in the simulation needs to be justified.	N/A

	² A simple, written justification from the UAS designer, including functional diagrams and a description of how the system works, explaining why the integrity claim (i.e. no (probable/remote) single failure criterion) is met is an acceptable means of compliance.	The UAS operator may use a UAS for which the UAS designer has issued a statement of compliance with the MoC to Light-UAS.2511 (https://www.easa.europa.eu/en/document-library/product-certification-consultations/final-means-compliance-light-uas2511-moc-light) using the form attached to the MoC when the UAS meets the conditions defined in such MoC. For UAS configurations exceeding the applicability of such MoC, the competent authority may decide to still accept statements based on such MoC with evidence available, or to accept appropriate MoC proposed by the UAS designer. Otherwise, the competent authority may request the UAS operator to use a UAS for which EASA has verified the claimed integrity.	

The following section is an alternative which should only be used in the specific use of a tether:

Containment of tethered UA	LEVEL of INTEGRITY	
	Low, Medium and High ¹	
Criterion #1 (Technical design)	(a) The length of the line is adequate to contain the UA in the operational volume. (b) The strength of the line is compatible with the ultimate loads ² expected during the operation. (c) The strength of attachment points is compatible with the ultimate loads ² expected during the operation. (d) The tether cannot be cut by rotating propellers.	
Comments	UAS operators may purchase a UAS designed to be used with a tether or they may apply a tether. In this case, the UAS operator is required to comply with criterion #1.	
Criterion #2 (Procedures)	The UAS operator has procedures to install and periodically inspect the condition of the tether.	
Comments	¹ The distinction between a 'medium' and a 'high' level of robustness for this criterion is achieved through the level of assurance provided below. ² Ultimate loads are identified as the maximum loads to be expected in service, including all possible nominal and failure scenarios multiplied by a 1.5 factor of safety.	

Containment of tethered UA	LEVEL of ASSURANCE

	Low	Medium	High
Criterion #1 (Technical design)	The UAS designer or the UAS operator declares ¹ that the required level of integrity has been achieved.	The UAS designer or the UAS operator has supporting evidence (including the tether material specifications) to claim the required level of integrity has been achieved. (a) This is typically achieved through testing or operational experience. (b) Tests can be based on simulations; however, the validity of the target environment used in the simulation needs to be justified.	The claimed level of integrity is validated by the competent authority of the Member State or by an entity that is designated by the competent authority.
Comments	¹ Supporting evidence for this declaration may still be requested by the competent authority.	N/A	N/A
Criterion #2 (Procedures)	The UAS operator declares to have adequate procedures.	(a) Procedures are validated against standards considered adequate by the competent authority and/or in accordance with means of compliance acceptable to that authority. (b) The adequacy of the procedures is proved through: — dedicated flight tests; or — simulation provided the simulation is proven valid for the intended purpose with positive results.	Same as 'medium'. In addition: (a) flight tests performed to validate the procedures cover the complete flight envelope or are proven to be conservative; (b) the procedures, flight tests and simulations are validated by the competent authority of the Member State or by an entity that is designated by the competent authority.
Comments	¹ Procedures do not require validation against either a standard or a means of compliance considered adequate by the competent authority.	¹ National aviation authorities (NAAs) may define the standards and/or the means of compliance they consider adequate. The SORA Annex B will be updated at a later point in time with a list of adequate standards based on the feedback provided by the NAAs.	N/A

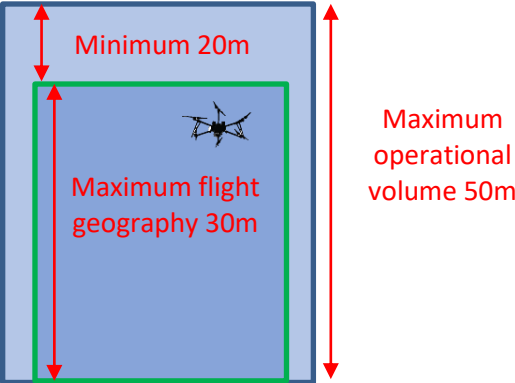
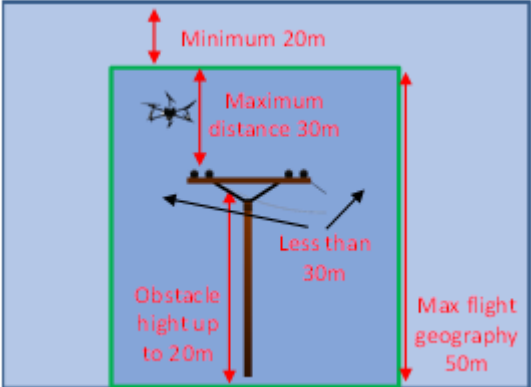
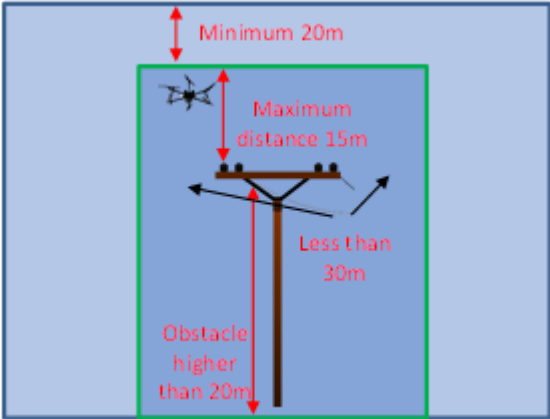
Annex I to AMC1 Article 11

ED Decision 2025/018/R

GLOSSARY OF TERMS

Term	Acronym	Definition
I.1. Abnormal situation		A situation in which it is no longer possible to continue the flight using normal procedures.
I.2. Acceptable risk		The level of risk that individuals or groups are willing to accept given the benefits gained. Each organisation will have its own acceptable risk level, which is derived from its legal and regulatory compliance responsibilities, its threat profile, and its business/organisational drivers and impacts.
I.3. Adequate		Whatever is necessary or sufficient for a specific requirement.
I.4. Adjacent airspace		The airspace adjacent to the operational volume. See Section S.2.2.6 of AMC1 Article 11 .
I.5. Adjacent ground area		The ground area adjacent to the ground risk buffer. See also Section S.2.2.5 of this AMC (SORA Main Body).
I.6. Aerodrome		A defined area (including any buildings, installations and equipment), on land or on water, on a fixed, fixed offshore or floating structure, including any buildings, installations and equipment thereon, intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.
I.7. Aerodrome environment		The aerodrome environment is normally protected by the Member State through the creation of a geographical zone defined according to Article 15 of Implementing Regulation (EU) 2019/947. The aerodrome environment in the SORA context is generally defined as: (a) class A, B, C, D or E controlled airspace which touches the surface with an aerodrome and/or controlled airspace which does not touch the surface, but in connection to an aerodrome (normally depicted on aeronautical charts and sectionals); or (b) any TMZ in class A, B, C, D or E controlled airspace.
I.8. Aeronautical information publication	AIP	A publication issued by or with the authority of a State and containing aeronautical information of a lasting character essential to air navigation.
I.9. Air risk class	ARC	The ARC is an initial assignment of generic collision risk of airspace before mitigations are applied. The ARC is assigned to airspace encounter categories (AECs) based on a qualitative assessment of collision risk of generic types of airspace.
I.10. Aircraft	a/c	Any machine that can derive support in the atmosphere from the reactions of the air other than the reaction of the air against the earth's surface.
I.11. Airframe		The fuselage, booms, nacelles, cowlings, fairings, air foil surfaces (including rotors but excluding propellers and rotating air foils of engines) and landing gear of an UA, and their accessories and controls.

Term	Acronym	Definition
I.12. Airspace encounter category	AEC	The AEC is a qualitative classification of the probability that a UAS would encounter a manned aircraft in typical civil airspace found in the U.S. and Europe. The airspace encounter risk is grouped by operational altitude, airport environment, controlled airspace, uncontrolled TMZ airspace, and in uncontrolled airspace over rural and/or urban populations. The AEC is based on the assessment of the proximity (the more aircraft in the airspace, the higher the rate of proximity, the greater the risk of collision), geometry (an airspace structure which reduces the probability that an aircraft finds itself on collision courses), and dynamics (in general, the faster the speed of the aircraft in the airspace, the greater the number of collision risks over a set time). Airspace where there is a higher density of manned aircraft, few airspace structural controls, and high aircraft closing speeds will experience higher airspace encounter rates than in airspace where there is low density, high airspace structure and slow speeds.
I.13. Airspace observer	AO	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. (Article 2(25) of Implementing Regulation (EU) 2019/947)
I.14. Airworthiness		The condition of an item (aircraft, aircraft system, or part) in which that item operates in a safe manner to accomplish its intended function.
I.15. Applicant		An individual or an organisation that desires to operate a UAS in a limited or restricted manner and submits the necessary technical, operational and human information related to the intended use of the UAS to the competent authority. See also Section S.2.5(b) of this AMC (SORA Main Body).
I.16. Assemblies of people		Means gatherings where persons are unable to move away due to the density of the people present. (Article 2(3) of Implementing Regulation (EU) 2019/947)
I.17. Assurance		The level of verification required by the competent authority prior to granting an approval. All the integrity requirements must still be fulfilled by the UAS operator, but the verification of the implementation can happen before the approval is granted or after in auditing.

Term	Acronym	Definition
I.18. Atypical air environment		Airspace where the risk of collision between a UAS and manned aircraft is acceptably low. Examples are: (a) restricted airspace or segregated areas; (b) airspace where normally manned aircraft should not be present (e.g. at a height low enough or close to an obstacle, excluding those potential landing sites for manned aircraft, see examples below)¹;    (c) airspace not covered in airspace encounter categories (AECs) 1 through 11.
I.19. Authority		The organisation responsible within the State concerned with the certification of compliance with applicable requirements.

¹ Only in areas where applicable and accepted by the competent authority.

Term	Acronym	Definition
I.20. Authorisation		The permit granted to a UAS operator by a competent authority.
I.21. Automatic system		Any system in which the remote crew is supported by mechanised or computerised components executing predefined processes.
I.22. Autonomous UA		Means an operation during which an unmanned aircraft operates without the remote pilot being able to intervene. (Article 2(17) of Implementing Regulation (EU) 2019/947)
I.23. Barrier		A material object or set of objects that separates, demarcates or serves as a barricade; or something immaterial that impedes or separates. Both physical and non-physical barriers are utilised and applied in hazard control, i.e. anything used to control, prevent or impede unwanted adverse energy flow and/or anything used to control, prevent or impede unwanted event flow.
I.24. Beyond visual line of sight operation	BVLOS	Means a type of UAS operation which is not conducted in VLOS. (Article 2(8) of Implementing Regulation (EU) 2019/947)
I.25. Beyond visual line of sight operation with airspace observers	BVLOS with AOs	A UAS operation whereby the remote pilot maintains uninterrupted situational awareness of the airspace in which the UAS operation is being conducted via visual airspace surveillance through one or more airspace observers, possibly aided by technological means. The remote pilot-in-command (RPIC) has direct control of the UAS at all times.
I.26. Catastrophic		Failure condition that could result in one or more fatalities.
I.27. Certification		The legal recognition based on an appropriate assessment that a product, part, service, organisation or person complies with the applicable requirements through the issuance of a certificate, licence, approval or other documents as required by national laws and procedures, attesting such compliance.
I.28. Civil aircraft		Aircraft other than public/State or military aircraft.
I.29. Collision avoidance		Averting physical contact between an aircraft and any other object or terrain.
I.30. Command and control link	C2 link	Means the data link between the UA and the CMU for the purpose of managing the flight. (Article 2(27) of Implementing Regulation (EU) 2019/947)
I.31. Commercial off-the-shelf	COTS	Components designed to be implemented into existing systems without extensive customisation and for which design data is not always available to the customer.
I.32. Competent authority		The authority responsible to assess the safety measures proposed by the UAS operator for a safety operation, following a specific operations risk assessment (SORA) and issuing the operational authorisation. See also Section S.2.5(e) of this AMC (SORA Main Body).
I.33. Compliance		Successful performance of all mandatory activities; agreement between the expected or specified result and the actual result.

Term	Acronym	Definition
I.34. Component		Any self-contained part, combination of parts, subassemblies or units, which perform a distinct function necessary to the operation of the system.
I.35. Configuration		The requirements, design and implementation that define a particular version of a system or system component.
I.36. Configuration control/management		The process of evaluating, approving or rejecting, and coordinating changes to configuration items after the formal establishment of their configuration identification.
I.37. Conformity		Aircraft or parts checked against design documents for correctness.
I.38. Contingency area		Means the projection of the contingency volume on the surface of the earth. (Article 2(31) of Implementing Regulation (EU) 2019/947)
I.39. Contingency procedures		Planned course of action designed by the organisation to respond effectively to a future event or abnormal situation that may or may not happen. It includes procedures executed by the remote pilot, or by the UA in case of autonomous flights, to return to normal operations or allow the safe cessation of the flight.
I.40. Contingency volume		Means the volume of airspace outside the flight geography where contingency procedures described in point (6)(d) of Appendix 5 to the Annex are applied. (Article 2(30) of Implementing Regulation (EU) 2019/947) See also Section S.2.2.3 of this AMC (SORA Main Body).
I.41. Control and monitoring unit	CMU	Means the equipment to control and monitor unmanned aircraft remotely as defined in point (32) of Article 3 of Regulation (EU) 2018/1139. (Article 2(26) of Implementing Regulation (EU) 2019/947)
I.42. Controlled airspace		Airspace class A, B, C, D and E. Airspace of defined dimensions within which air traffic control service is provided in accordance with the airspace classification. Controlled airspace does not imply that separation services are provided at all times. Classes A, B, C, D and E are described in ICAO Annex 11, and in ICAO Annex 2 Section 6.
I.43. Controlled ground area		Means the ground area where the UAS is operated and within which the UAS operator can ensure that only involved persons are present. (Article 2(21) of Implementing Regulation (EU) 2019/947) Note: the concept of controlled ground area is applicable also for UAS operations over water surfaces.
I.44. Cooperative aircraft		Aircraft that have an electronic means of identification (i.e. a transponder) aboard and operating.
I.45. Critical (function)		A function whose loss would prevent the continued safe flight and landing of the UA thereby causing a significant increase in the safety risk to third parties and/or the environment involved.

Term	Acronym	Definition
I.46. Critical area		The ground area where persons would be expected to be impacted by the UA in the event of a loss of control of the operation or an unplanned landing.
I.47. Critical infrastructure		Means systems and assets vital to national defence, national security, economic security, public health or safety including both regional and national infrastructure.
I.48. Critical systems		Systems required for the operation to perform one or more critical functions.
I.49. Criticality		The degree of impact a malfunction has on the operation of a system.
I.50. Danger area		A danger area is airspace of defined dimensions within which activities dangerous to the flight of aircraft may exist at specified times.
I.51. Data link		A term referring to all interconnections to, from and within the UAS. It includes control, flight status, communication and payload links.
I.52. Demonstration		A method of proof of performance by observation.
I.53. Detect and avoid	DAA	The capability to see, sense or detect conflicting traffic or other hazards and take the appropriate action to comply with the acceptable rules of flight.
I.54. Emergency recovery capability		A UAS safety feature (e.g. return-to-home) that provides for the cessation of the UA operation in a manner that minimises the risk to persons on the ground, other airspace users and critical infrastructure.
I.55. Emergency procedures		Planned course of action designed by the UAS operator to respond effectively to an emergency condition. They deal with controlling the aircraft to either return to a state where the operation is 'in control' or to minimise hazards until the flight has ended. It includes procedures that are executed by the remote pilot or by the UA itself. See also Section S.2.3.2(d) of this AMC (SORA Main Body).
I.56. Emergency response plan	ERP	Plan of actions to be conducted in a certain order or manner, in response to an emergency event. For additional information, please refer to Section S.2.3.2(e) of AMC1 Article 11 .
I.57. Environment		(a) The aggregate of operational and ambient conditions to include the external procedures, conditions and objects that affect the development, operation and maintenance of a system. Operational conditions include traffic density, communication density, workload, etc. Ambient conditions include weather, EMI, vibration, acoustics, etc.; and (b) Everything external to a system which can affect or be affected by the system.
I.58. Equipment		A complete assembly operating either independently or within a system/subsystem that performs a specific function.

Term	Acronym	Definition
I.59. Failure		The loss of a function or the malfunction of a system or a part of it. It should be understood as an occurrence that affects the operation of a component, part or element such that it can no longer function as intended. Errors may cause failures but are not considered failures. Some structural or mechanical failures may be excluded from the criterion if it can be shown that these structural or mechanical parts were designed according to aviation industry best practices.
I.60. Failure mode		The way in which the failure of an item occurs.
I.61. Fixed-wing UA		It includes configurations such as aeroplanes, kites, gliders, etc.
I.62. 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 described in point (6)(c) of Appendix 5 to the Annex. (Article 2(28) of Implementing Regulation (EU) 2019/947) See also Section S.2.2.2 of this AMC (SORA Main Body).
I.63. Flight termination system	FTS	Procedure or function which aims to immediately end the flight.
I.64. Fly-away		A condition due to loss of control of the operation, where the UAS is leaving the operational volume and it is not possible to regain control of the UA with none of the normal, contingency or emergency procedures being effective.
I.65. Functional test based	FTB	An approach to demonstrate compliance with some OSOs, as defined in Section 3 of Annex E to this AMC.
I.66. Geo-awareness		Means a function that, based on the data provided by Member States, detects a potential breach of airspace limitations and alerts the remote pilots so that they can take immediate and effective action to prevent that breach. (Article 2(15) of Implementing Regulation (EU) 2019/947)
I.67. Geo-caging		An automatic function that helps the remote pilot to maintain the UAS within the defined overall volume (a 'cage').
I.68. Geo-fencing		An automatic function for preventing the UA from entering a prescribed volume.
I.69. Ground risk buffer		An area over the surface of the earth, which surrounds the operational volume and that is specified in order to minimise the risk to third parties on the surface in the event of the unmanned aircraft leaving the operational volume. (Article 2(33) of Implementing Regulation (EU) 2019/947) See also Section S.2.2.4 of this AMC (SORA Main Body).
I.70. Handover		The act of passing command and control from one control and monitoring unit to another.
I.71. Hazard		A potentially unsafe condition resulting from failures, external events, errors, or a combination of these.

Term	Acronym	Definition
I.72. Height		The vertical distance of a level, a point or an object considered as a point, measured from a specified datum.
I.73. Human error		Human action with unintended consequences.
I.74. Human factors	HF	Factors affecting human performance and referring to principles that apply to aeronautical design, certification, training, operations and maintenance, and that seek safe interfaces between the human and other system components by proper consideration to human performance.
I.75. Human factors principles		Principles which apply to aeronautical design, certification, training, operations and maintenance, and that seek safe interface between the human and other system components by proper consideration to human performance.
I.76. Initial air risk class	Initial ARC	Initial classification of the airspace where UAS operations are intended to be performed before risk mitigations are applied.
I.77. Intrinsic ground risk class	iGRC	Initial classification of the ground risk before ground mitigations are applied.
I.78. Intrinsic ground risk class footprint	iGRC footprint	The projection of the operational volume plus ground risk buffer on the surface of the earth.
I.79. Incident		An occurrence other than an accident that affects or could affect the safety of operations.
I.80. Industry standard		A published document established by consensus and approved by a recognised body that sets out specifications and procedures to ensure that a material, product, method or service meets its purpose and consistently performs to its intended use. Standards are industry-developed standards that define minimum safety and performance requirements of an acceptable product or a means of compliance to specific requirements.
I.81. Inspection		An examination of an item against a specific standard.
I.82. Integrated airspace	IA	Integrated airspace is considered 500 ft AGL up to VHL airspace (≈FL600) and any airspace where manned aircraft will operate below 500 ft AGL for take-off and landing. It is airspace where UAS are expected to conform and comply with the existing manned aircraft operating rules, procedures and equipment.
I.83. Integrity		Attribute of a system or an item indicating that it can be relied upon to work as expected.
I.84. Involved person		A person directly involved with the operation of the UAS or is fully aware that the UAS operation is being conducted near them. Involved persons are fully aware of the risks involved with the UAS operation and have accepted these risks. The UAS operator informs involved persons of the risks and provides training in the relevant emergency procedures and/or contingency plans.

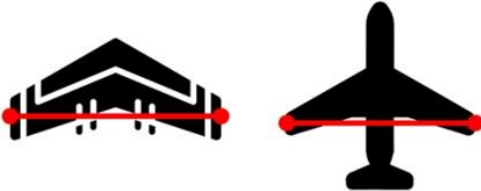
Term	Acronym	Definition
I.85. Loss of control of the operation		A situation — whose outcome heavily relies on providence; or — which cannot be handled by a contingency procedure.
I.86. Lost C2 link (loss of data link)		The loss of the command-and-control link contact with the UA such that the remote pilot can no longer intervene in the UA's flight control.
I.87. Maintenance		The inspection, overhaul, repair, preservation and/or replacement of parts.
I.88. Malfunction		The occurrence of a condition whereby the UAS operation is outside specified limits.
I.89. Maximum take-off mass	MTOM	Means the maximum unmanned aircraft mass, including payload and fuel, as defined by the manufacturer or the builder, at which the unmanned aircraft can be operated. (Article 2(22) of Implementing Regulation (EU) 2019/947)
I.90. Mid-air collision	MAC	An accident where two aircraft come into contact with each other while both are in flight.
I.91. Minimum aviation system performance standard	MASPS	A MASPS specifies the characteristics that should be useful to UAS designers, installers, service providers and users of systems intended for operational use within a defined volume. Where the systems are global in nature, the system may have international applications that are taken into consideration. The MASPS describes the system (subsystems/functions) and provides information needed to understand the rationale for system characteristics, operational goals, requirements and typical applications. Definitions and assumptions essential to the proper understanding of the MASPS are provided as well as minimum system test procedures to verify system performance compliance (e.g. end-to-end performance verification).
I.92. Mitigation		A means to reduce the risk of a hazard.
I.93. Minimum operational performance specification	MOPS	A MOPS provides standards for specific equipment that are useful to UAS designers, installers and users of the equipment. The word 'equipment' used in a MOPS includes all components and units necessary for the system to properly perform its intended function(s). The MOPS provides the information needed to understand the rationale for the equipment characteristics and the requirements stated. The MOPS describes typical equipment applications and operational goals and establishes the basis for required performance under the standard. Definitions and assumptions essential to the proper understanding are provided as well as installed equipment tests and operational performance characteristics for equipment installations.

Term	Acronym	Definition
I.94. Multiple simultaneous UAS operations	MSO	UA operations where multiple UA are under a common (centralised) flight management and the individual UA either: — operate relative to each other under the common flight management (e.g. formation flights with a swarm of UAS performing displays for entertainment); or — operate independently of each other under the common flight management.
I.95. National aviation authority	NAA	Also referred to as ‘civil aviation authority’, is a government statutory authority in each Member State that issues the operational authorisation and conduct the oversight if the UAS operator.
I.96. Night		‘Night’ means the hours between the end of evening civil twilight and the beginning of morning civil twilight as defined in Implementing Regulation (EU) No 923/2012. (Article 2(34) of Implementing Regulation (EU) 2019/947) <i>Note:</i> Civil twilight ends in the evening when the centre of the sun’s disc is 6 degrees below the horizon and begins in the morning when the centre of the sun’s disc is 6 degrees below the horizon.
I.97. Normal procedure		A set of instructions covering those features of operations which lend themselves to a definite or standardised procedure without loss of effectiveness.
I.98. Operation out of control		An operation unintentionally being conducted outside the limits approved in the authorisation.
I.99. Operational life		It is defined by the UAS designer as the maximum flight hours and/or cycles a UAS operator should use the UAS while continuously conforming with the maintenance design requirements.
I.100. Operations manual	OM	A manual containing procedures, instructions and guidance for use by operational personnel in the execution of their duties. Annex A to this AMC illustrates an example for its content.
I.101. Operational volume		Is the combination of the flight geography and the contingency volume. (Article 2(32) of Implementing Regulation (EU) 2019/947) See also Section S.2.2.1 of this AMC (SORA Main Body).
I.102. Parachute		A device used or intended to be used to retard the fall of a body or object through the air.
I.103. Population density		The number of people living per unit of an area (e.g. per square mile or square kilometre).
I.104. Procedure		Standard, detailed steps that prescribe how to perform specific tasks.
I.105. Process		A set of interrelated resources and activities, which transform inputs into outputs.
I.106. Qualification		A process through which a State / competent authority / applicant ensures that a specific implementation satisfies the applicable requirements with an adequate level of confidence.

Term	Acronym	Definition
I.107. Quantification		The act of assigning a numerical value to or measuring the probability that a specific event will occur.
I.108. Reliability		The probability that an item will perform a required function under specified conditions, without failure, for a specified period of time.
I.109. Remote crew member		A member of the crew that performs duties essential to the safety of flight and whose duties and responsibilities have been assigned to them by the UAS operator. It may include the remote pilot-in-command (RPIC), airspace observers (AOs) and UA observers, maintenance staff, launch and recovery system operators etc..
I.110. Remote pilot (in command)	RPIC	A person, nominated by the UAS operator, responsible for the safe conduct of the flight of a UA by operating its flight controls either manually or, when the UA flies automatically, by monitoring its course and remaining able to intervene and change the UA course at any time.
I.111. Risk		The combination of the frequency (probability) of an occurrence and its associated level of severity.
I.112. Risk analysis		The development of qualitative and/or quantitative estimate of risk based on evaluation and mathematical techniques.
I.113. Risk assessment		The process by which the results of a risk analysis are used to make decisions.
I.114. Risk estimation		The combination of the consequences and likelihood of the hazard.
I.115. Risk ratio		The ratio between a conditional probability with a mitigating system, divided by a conditional probability without a mitigating system. An example of conditional probability is the chance that, given an encounter, a potential mid-air collision occurs. A relative risk measure, which compares the probability of an event in a non-mitigated scenario to the probability of the same event in a mitigated scenario.
I.116. Robustness		Means the property of mitigations resulting from combining the safety gain provided by the mitigations and the level of assurance and integrity that the safety gain has been achieved. (Article 2(5) of Implementing Regulation (EU) 2019/947)
I.117. Rotorcraft-helicopter UA		It includes all vertical-lift UA configurations having up to 2 rotors.
I.118. Rural air volume		In the context of air risk, it is the volume not defined as urban environment and is not within the aerodrome traffic zone (ATZ) of an airport.
I.119. Safety		The state in which the risk of harm to persons or property on the ground or water surface is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and risk management.

Term	Acronym	Definition
I.120. Safety objective		A measurable goal or desirable outcome related to safety.
I.121. Safety risk		The composite of predicted severity and likelihood of the potential effect of a hazard.
I.122. See and avoid	S&A	The requirement for the pilot of an aircraft to ‘see’ and ‘avoid’ a collision, and to remain well clear of other aircraft in accordance with 14 CFR 91.113, SERA.3201, and ICAO Annex 2 Section 3.2.
I.123. Segregated airspace		Airspace of specified dimensions allocated for exclusive use to a specific user(s).
I.124. Sense and avoid	SAA	See, detect and avoid.
I.125. Separation		Maintaining a specific minimum distance between two or more aircraft or between aircraft and terrain to avoid collisions, normally by requiring aircraft to fly at set levels or level bands, on set routes or in certain directions, or by controlling an aircraft’s speed.
I.126. Severity		The consequence or impact of a hazard’s effect or outcome in terms of degree of loss or harm.
I.127. Sheltering		Expected protection of people from the UA in case it crashes into a building or a structure.
I.128. Specific operations risk assessment	SORA	A methodology to guide both the UAS operator and the competent authority in determining whether a UAS operation can be conducted in a safe manner.
I.129. ‘Specific’ category		A UAS operation category where a proportionate approach to the assessment of the risk will be taken by requiring the UAS operator to present a specific operations risk assessment (SORA) of the UAS operation before operational authorisation is granted by the competent authority.
I.130. Standard operational procedure	SOP	A set of instructions covering those features of operations which lend themselves to a definite or standardised procedure without loss of effectiveness.
I.131. Standard scenario	STS	A description of a type of UAS operation for which a specific operations risk assessment (SORA) has been conducted and on the basis of which mitigations have been proposed that are deemed acceptable by the competent authority. The use of a standard scenario greatly simplifies and expedites the application process for both the UAS operator and the competent authority.

Term	Acronym	Definition
I.132. Strategic conflict mitigation		A set of procedures aimed at reducing the UAS encounter probability prior to UAS take-off. Strategic mitigation is about controlling or mitigating risks by reducing local aircraft density or time of exposure of an individual UAS. Strategic mitigations tend to take the form of operational restrictions of time or space. Strategic mitigations do not fulfil the 14 CFR 91.113, SERA.3201, or ICAO Annex 2 Section 3.2 'see and avoid' requirement. (Examples of strategic mitigation: an operational restriction to fly between the hours of 10PM and 3AM; operational restriction to stay below 500 ft AGL; operational restriction to stay within 1 mile of a geographic location; etc.) Strategic mitigation traces to the strategic layer of ICAO's conflict management concept.
I.133. System		A combination of interrelated items arranged to perform a specific function or specific functions.
I.134. System safety		System safety is a specialty within system engineering that supports programme risk management. It is the application of engineering and management principles, criteria and techniques to optimise safety. The goal of system safety is to optimise safety through the identification of safety-related risks, eliminating or controlling them through design and/or procedures, based on acceptable system safety precedence.
I.135. Tactical conflict mitigation		The act of mitigating collision risk over a very short time horizon (minutes to seconds). Tactical mitigations take the form of SDAF loops (see, decide, action and feedback loop). Tactical mitigation systems operate using a sensor to 'see' the threat, 'deciding' how to mitigate the risk, 'acting' on the decision, and then having a feedback system in order to monitor the risk and implement new corrections if needed. Tactical mitigation may fulfil the 14 CFR 91.113, SERA.3201 and ICAO Annex 2 Section 3.2 'See and Avoid' requirement (examples of tactical mitigation: TCAS, ATC, ACAS, MIDCAS, DAA, ABSAA, GBSAA, see and avoid, etc.). Tactical mitigation traces to the separation requirements and collision avoidance layers of the ICAO's conflict management concept.
I.136. Testing		The process of operating a system under specified conditions, observing or recording the results, and making an evaluation of some aspects of the system.
I.137. Third party		A party that derives no economic benefit and has no control over the risk associated with the UAS operation.
I.138. Threat		An occurrence that in the absence of appropriate threat barriers can potentially result in a hazard.

Term	Acronym	Definition
I.139. Total system error		All errors impacting the position of the UA. It includes the accuracy of the navigation solution, the flight technical error of the UAS, as well as the path definition error (e.g. map error) and latencies. Errors are usually determined by the interaction of several contributes, such as positioning sensors providing position, navigation and flight control systems, system and human latencies, and environment.
I.140. Transponder mandatory zone	TMZ	Airspace of defined dimensions in which the carriage and operation of pressure-altitude reporting transponders is mandatory.
I.141. UA characteristic dimension	UA CD	The width of the UA in the direction transversal to the direction of flight (refer to Annex F Edition 2.5, critical area). For example: — for fixed-wing UA, regardless of the number of planes, including hybrid configurations, the UA characteristic dimension is the wingspan;  — for rotorcraft UA (e.g. helicopters or gyroplanes), the UA characteristic dimension is the diameter of the main rotor;  — for VTOL-capable aircraft (VCA), such as multicopters, the UA characteristic dimension is defined by the maximum distance (i.e. the diagonal distance) between the blade tips. 
I.142. UAS flight manual		Sometimes also referred to as ‘manufacturer’s instructions’, it is a manual developed by the designer of the UAS, containing limitations within which the aircraft is to be considered airworthy, and instructions and information necessary to the flight crew members for the safe operation of the aircraft.

Term	Acronym	Definition
I.143. UAS traffic management (UTM)	UTM	A specific aspect of air traffic management which manages UAS operations safely, economically and efficiently through the provision of facilities and a seamless set of services in collaboration with all parties and involving airborne and ground-based functions. In Europe, it is referred to as 'U-space'.
I.144. UAS component design and production organisation		The organisation designing and producing a component to be installed on a UAS (e.g. a parachute). It is also responsible for carrying out the test, check compatibility and interface with the UAS models listed in the component instructions manual.
I.145. UAS component installer		The organisation responsible for installing a component (e.g. a parachute) on a UAS model listed in the component instructions manual, using the procedure defined in the same manual. Depending on the level of integration of the component, the component installer may be the UAS operator or in some cases the UAS production organisation or the organisation designated by them.
I.146. UAS operation		It may consist in one or multiple flights, even in different locations and with different purposes, conducted with a UAS with the same features, characterised by the same final air risk, final ground risk, SAIL score, ground and air risk mitigations and containment level.
I.147. UAS operator		Means any legal or natural person operating or intending to operate one or more UAS. (Article 2(2) of Implementing Regulation (EU) 2019/947) See also Section S.2.5(c) of this AMC.
I.148. Uncontrolled airspace		For the purpose of this assessment, uncontrolled airspace is that defined as class G airspace.
I.149. 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. (Article 2(18) of Implementing Regulation (EU) 2019/947)
I.150. Unmanned aircraft	UA	Means any aircraft operating or designed to operate autonomously or to be piloted remotely without a pilot on board. (Article 3(30) of Regulation (EU) 2018/1139)
I.151. Unmanned aircraft system	UAS	Means an unmanned aircraft, as defined in Article 3(30) of Regulation (EU) 2018/1139, and its control and monitoring unit. (Article 2(1) of Implementing Regulation (EU) 2019/947)
I.152. Urban air volume		In the context of air risk, it is the volume above a town or a city, starting from the ground, where there is a higher probability that air operations (with or without pilots on board) may take place for several purposes (e.g. aerial work, delivery, transport, emergency, etc.).
I.153. U-space		The UAS traffic management (UTM) concept defined in Europe through Implementing Regulation (EU) 2021/664.
I.154. Verified		A term used to describe controls / safety requirements that are objectively determined to have been met.

Term	Acronym	Definition
I.155. Very high-level airspace	VHL airspace	Airspace from FL600 and above. The altitude of FL600 is not a hard value, but an initial value used in this assessment as a starting point for discussion. It may be adjusted by the regulatory authorities as needed. UAS operating in VHL airspace may have to comply with operating rules, procedures and equipment not yet identified. VHL airspace is airspace where manned aircraft operations are very infrequent.
I.156. Very low-level airspace	VLL airspace	Airspace from ground level to 500 ft AGL. The altitude of 500 ft AGL is not a hard value, but an initial value used in this assessment as a starting point for discussion and may be adjusted by the regulatory authorities as needed. UAS operating in VLL airspace may have to comply with operating rules, procedures and equipment not yet identified. VLL airspace is airspace where manned aircraft operations are very infrequent. VLL airspace excludes class A, B, C, D, E and F airspace and airport environments.
I.157. Visual line of sight operation	VLOS operation	Means a type of UAS operation in which the remote pilot is able to maintain continuous unaided visual contact with the unmanned aircraft, allowing the remote pilot to control the flight path of the UA in relation to other aircraft, people and obstacles for the purpose of avoiding collisions. (Article 2(7) of Implementing Regulation (EU) 2019/947)
I.158. VTOL-capable UA		It includes vertical-lift UA configurations with 3 or more rotors and fixed-wing aircraft capable of vertically taking off and landing. It includes multirotor UA.

AMC1bis Article 11 Rules for conducting an operational risk assessment

ED Decision 2025/018/R

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

EDITION December 2020

1. Introduction

1.1 Preface

- (a) This SORA is based on the document developed by JARUS, providing a vision on how to safely create, evaluate and conduct an unmanned aircraft system (UAS) operation. The SORA provides a methodology to guide both the UAS operator and the competent authority in determining whether a UAS operation can be conducted in a safe manner. The document should not be used as a checklist, nor be expected to provide answers to all the challenges related to the integration of the UAS in the airspace. The SORA is a tailoring guide that allows a UAS operator to find a best fit mitigation means, and hence reduce the risk to an acceptable level. For this reason, it does not contain prescriptive requirements, but rather safety objectives to be met at various levels of robustness, commensurate with the risk.
- (b) The SORA is meant to inspire UAS operators and competent authorities and highlight the benefits of a harmonised risk assessment methodology. The feedback collected from real-life UAS operations will form the backbone of the updates in the upcoming revisions of the document.

1.2 Purpose of the document

- (a) The purpose of the SORA is to propose a methodology to be used as an acceptable means to demonstrate compliance with [Article 11](#) of the UAS Regulation, that is to evaluate the risks and determine the acceptability of a proposed operation of a UAS within the 'specific' category.
- (b) Due to the operational differences and the expanded level of risk, the 'specific' category cannot automatically take credit for the safety and performance data demonstrated with the large number of UA operating in the 'open¹' category. Therefore, the SORA provides a consistent approach to assess the additional risks associated with the expanded and new UAS operations that are not covered by the 'open' category.
- (c) The SORA is not intended as a one-stop-shop for the full integration of all types of UAS in all classes of airspace.
- (d) This methodology may be applied where the traditional approach to aircraft certification (approving the design, issuing an airworthiness approval and type certificate) may not be appropriate due to an applicant's desire to operate a UAS in a limited or restricted manner. This methodology may also support the activities necessary to determine the associated airworthiness requirements. This assumes that the safety objectives set forth in, or derived from, those applicable for the

¹ As defined by [Article 4](#) of the UAS Regulation.

‘certified’¹ category, are consistent with the ones set forth or derived for the ‘specific’ category.

- (e) The methodology is based on the principle of a holistic/total system safety risk-based assessment model used to evaluate the risks related to a given UAS operation. The model considers the nature of all the threats associated with a specified hazard, the relevant design, and the proposed operational mitigations for a specific UAS operation. The SORA then helps to evaluate the risks systematically, and determine the boundaries required for a safe operation. This method allows the applicant to determine the acceptable risk levels, and to validate that those levels are complied with by the proposed operations. The competent authority may also apply this methodology to gain confidence that the UAS operator can conduct the operation safely.
- (f) To avoid repetitive individual approvals, EASA will apply the methodology to define ‘standard scenarios’ or ‘predefined risk assessments’ for the identified types of ConOps with known hazards and acceptable risk mitigations.
- (g) The methodology, related processes, and values proposed in this document are intended to guide the UAS operator when performing a risk assessment in accordance with [Article 11](#) of the UAS Regulation.

1.3 Applicability

- (a) The methodology presented in this document is aimed at evaluating the safety risks involved with the operation of UAS of any class, size or type of operation (including military, experimental, research and development and prototyping). It is particularly suited, but not limited to, ‘specific’ operations for which a hazard and a risk assessment are required.
- (b) The safety risks associated with collisions between UA and manned aircraft are in the scope of the methodology. The risk of a collision between two UA or between a UA and a UA carrying people will be addressed in future revisions of the document.
- (c) In the event of a mishap, the carriage of people or payloads on board the UAS (e.g. weapons) that present additional hazards is explicitly excluded from the scope of this methodology.
- (d) Security aspects are excluded from the applicability of this methodology when they are not limited to those confined by the airworthiness of the systems (e.g. the aspects relevant to protection from unlawful electromagnetic interference.)
- (e) Privacy and financial aspects are excluded from the applicability of this methodology.
- (f) The SORA can be used to support waiving the regulatory requirements applicable to the operation if it can be demonstrated that the operation can be conducted with an acceptable level of safety.
- (g) In addition to performing a SORA in accordance with the UAS Regulation, the UAS operator must also ensure compliance with all the other regulatory requirements applicable to the operation that are not necessarily addressed by the SORA.

¹ As defined by [Article 6](#) of the UAS Regulation.

1.4 Key concepts and definitions

1.4.1 Semantic model

- (a) To facilitate effective communication of all aspects of the SORA, the methodology requires the standardised use of terminology for the phases of operation, procedures, and operational volumes. The semantic model shown in Figure 1 provides a consistent use of the terms for all SORA users. Figure 2 provides a graphical representation of the model and a visual reference to further aid the reader in understanding the SORA terminology.

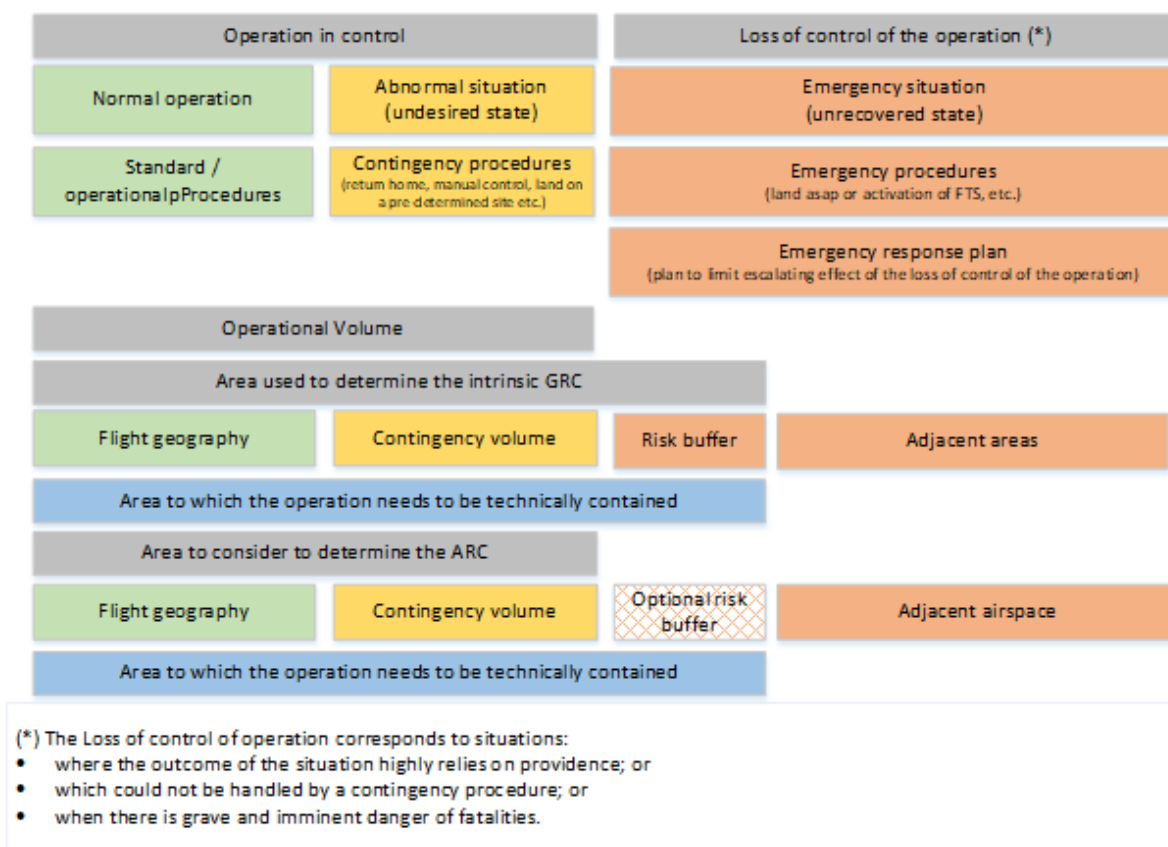


Figure 1 — SORA semantic model

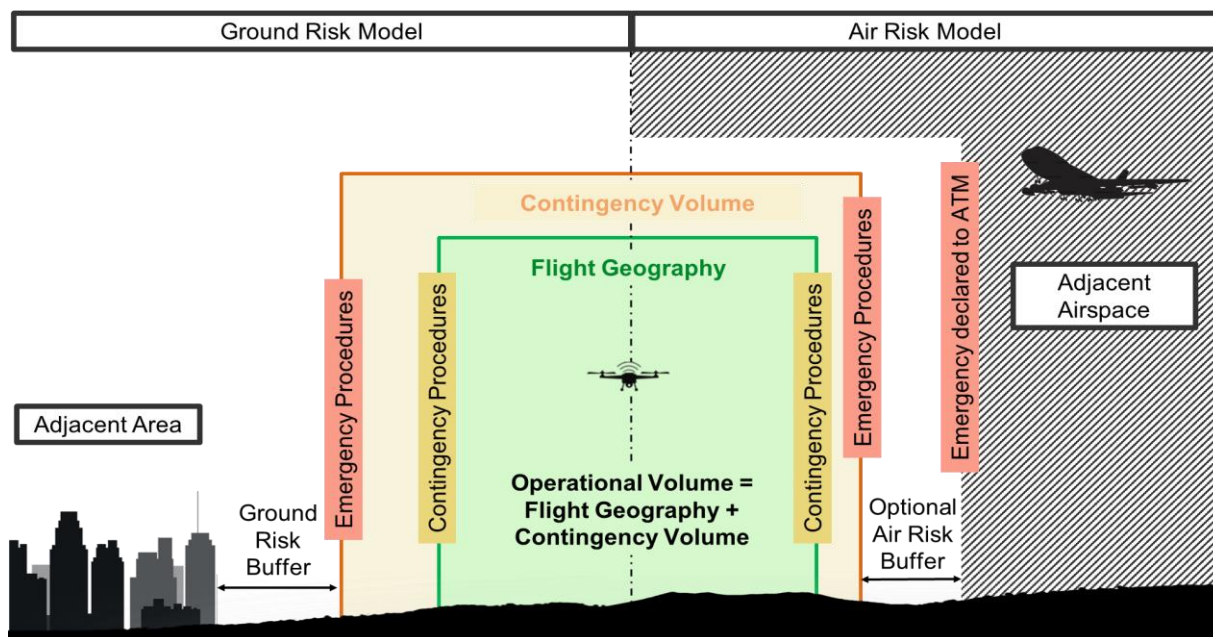


Figure 2 — Graphical representation of the SORA semantic model

1.4.2 Introduction to robustness

- (a) To properly understand the SORA process, it is important to introduce the key concept of robustness. Any given risk mitigation or operational safety objective (OSO) can be demonstrated at differing levels of robustness. The SORA process proposes three different levels of robustness: low, medium and high, commensurate with the risk.
- (b) The **robustness** designation is achieved using both the **level of integrity** (i.e. safety gain) provided by each mitigation, and the **level of assurance** (i.e. method of proof) that the claimed safety gain has been achieved. These are both risk-based.
- (c) The activities used to substantiate the level of integrity are detailed in Annexes B, C, D and E. Those annexes provide either guidance material or reference industry standards and practices where applicable.
- (d) General guidance for the level of assurance is provided below:
 - (1) A **low** level of assurance is where the applicant simply declares that the required level of integrity has been achieved.
 - (2) A **medium** level of assurance is where the applicant provides supporting evidence that the required level of integrity has been achieved. This is typically achieved by means of testing (e.g. for technical mitigations) or by proof of experience (e.g. for human-related mitigations).
 - (3) A **high** level of assurance is where the achieved integrity has been found to be acceptable by a competent third party.
- (e) The specific criteria defined in the Annexes take precedence over the criteria defined in paragraph d.

- (f) Table 1 provides guidance to determine the level of robustness based on the level of integrity and the level of assurance:

	Low assurance	Medium assurance	High assurance
Low integrity	Low robustness	Low robustness	Low robustness
Medium integrity	Low robustness	Medium robustness	Medium robustness
High integrity	Low robustness	Medium robustness	High robustness

Table 1 — Determination of robustness level

- (g) For example, if an applicant demonstrates a medium level of integrity with a low level of assurance, the overall robustness will be considered to be low. In other words, the robustness will always be equal to the lowest level of either the integrity or the assurance.

1.5 Roles and responsibilities

- (a) While performing a SORA process and assessment, several key actors might be required to interact in different phases of the process. The main actors applicable to the SORA are described in this section.
- (b) UAS operator — The UAS operator is responsible for the safe operation of the UAS, and hence the safety risk analysis. In accordance with [Article 5](#) of the UAS Regulation, the UAS operator must substantiate the safety of the operation by performing the specific operational and risk assessment, except for the cases defined by the same [Article 5](#). Supporting material for the assessment may be provided by third parties (e.g. the manufacturer of the UAS or equipment, U-space service providers, etc.). The UAS operator obtains an operational authorisation from the competent authority/ANSP. A UAS operator having a LUC cannot be granted the privilege to assess compliance with the design requirements when a UAS with a design verification report¹ (DVR) or a (restricted) type certificate ((R)TC) is required.
- (c) Applicant — The applicant is the party seeking operational approval. The applicant becomes the UAS operator once the operation has been approved.
- (d) UAS manufacturer — For the purposes of the SORA, the UAS manufacturer is the party that designs and/or produces the UAS. The UAS manufacturer has unique design evidence (e.g. for the system performance, the system architecture, software/hardware development documentation, test/analysis documentation, etc.) that they may choose to make available to one or many UAS operator(s) or to the competent authority to help to substantiate the UAS operator's safety case. Alternatively, a potential UAS manufacturer may utilise the SORA to target design objectives for specific or generalised operations. To obtain airworthiness approval(s), these design objectives could be complemented by the use of certification specifications (CS) or industry consensus standards if they are found to be acceptable by EASA.
- (e) Component manufacturer — The component manufacturer is the party that designs and/or produces components for use in UAS operations. The component manufacturer has unique design evidence (e.g. for the system performance, the

¹ https://www.easa.europa.eu/sites/default/files/dfu/guidelines_design_verification_uas_medium_risk.pdf

system architecture, software/hardware development documentation, test/analysis documentation, etc.) that they may choose to make available to one or many UAS operator(s) to substantiate a safety case.

- (f) Competent authority — The competent authority that is referred to throughout this AMC is the authority designated by the Member State in accordance with [Article 17](#) of the UAS Regulation to assess the safety case of UAS operations and to issue the operational authorisation in accordance with [Article 12](#) of the UAS Regulation. The competent authority may accept an applicant's SORA submission in whole or in part. Through the SORA process, the applicant may need to consult with the competent authority to ensure the consistent application or interpretation of individual steps. The competent authority must perform oversight of the UAS operator in accordance with paragraphs (i) and (j) of [Article 18](#) of the UAS Regulation. According to Regulation (EU) 2018/1139¹ (the EASA 'Basic Regulation'), EASA is the competent authority in the European Union to verify compliance of the UAS design and its components with the applicable rules, while the authority that is designated by the Member State is the competent authority to verify compliance with the operational requirements and compliance of the personnel's competency with those rules. The following elements are related to the UAS design:
- OSOs #02 (limited to design criteria), #04, #05, #06, #10, #12, #18, #19 (limited to criterion #3), #20, #23 (limited to criterion #1) and #24;
 - M2 mitigation for ground risk (criterion #1);
 - verification of the system to contain the UAS to avoid an infringement of the adjacent areas on the ground and/or adjacent airspace, in accordance with Step #9 of the SORA process.

If the UAS operation is classified as SAIL V and VI, compliance with the design provisions defined by SORA (i.e. design-related OSOs, mitigation means linked with the design and containment function) should be demonstrated through a type certificate (TC) issued by EASA according to Annex I (Part 21) to Regulation (EU) No 748/2012² as defined in Article 40(1)(d) of Regulation (EU) 2019/945³. For the other OSOs and mitigation means, the competent authority may verify compliance or may define which entity is able to verify compliance with them as a third party.

- (1) If the UAS operation is classified as SAIL IV, compliance with the design-related SORA provisions (i.e. design-related OSOs, mitigation means linked with the design and containment function) should be demonstrated through a DVR issued by EASA. Evidence of compliance with the other OSOs and mitigations (not related to design) will be provided to the competent

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/?uri=CELEX%3A32018R1139>).

² Commission Regulation (EU) No 748/2012 of 3 August 2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations (OJ L 224, 21.8.2012, p. 1) (<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32012R0748&qid=1622557691925>).

³ Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems (OJ L 152, 11.6.2019, p. 1) (<https://eur-lex.europa.eu/legalcontent/EN/TXT/?uri=CELEX:32019R0945>).

authority according to the level of robustness of the OSOs, that will assess them as part of the application for the operational authorisation.

- (2) If the UAS operation is classified as SAIL I, II or III, the competent authority may accept a declaration submitted by the UAS operator for the compliance with all OSOs and mitigations related to design. The competent authority may check the statements of the UAS operator, in particular with regard to the claimed level of integrity and robustness of the UAS for the considered SAIL.
- (3) Despite the SAIL, when the claimed level of robustness of the mitigation means M2 is high, the competent authority should require the operator to use a UAS with a DVR issued by EASA limited to compliance with those mitigation means¹.
- (g) ANSP — The ANSP is the designated provider of air traffic service in a specific area of operation (airspace). The ANSP assesses whether the proposed flight can be safely conducted in the particular airspace that it covers, and if so, authorises the flight.
- (h) U-space service provider — U-space service providers are entities that provide services to support the safe and efficient use of airspace.
- (i) Remote pilot — The remote pilot is designated by the UAS operator, or, in the case of general aviation, the aircraft owner, as being charged with safely conducting the flight.

2. The SORA process

2.1 Introduction to risk

- (a) Many definitions of the word '**risk**' exist in the literature. One of the easiest and most understandable definitions is provided in SAE ARP 4754A / EUROCAE ED-79A: 'the combination of the frequency (probability) of an occurrence and its associated level of severity'. This definition of 'risk' is retained in this document.
- (b) The consequence of an occurrence will be designated as **harm** of some type.
- (c) Many different categories of harm arise from any given occurrence. Various authors on this topic have collated these categories of harm as supported by the literature. This document will focus on occurrences of harm (e.g. a UAS crash) that are short-lived and usually give rise to a near loss of life. Chronic events (e.g. toxic emissions over a period of time) are explicitly excluded from this assessment. The categories of harm in this document are the potential for:
 - (1) fatal injuries to third parties on the ground;
 - (2) fatal injuries to third parties in the air; or
 - (3) damage to critical infrastructure.
- (d) It is acknowledged that the competent authorities, when appropriate, may consider additional categories of harm (e.g. the disruption of a community, environmental damage, financial loss, etc.). This methodology could also be used for those categories of harm.

¹ If the UAS has a DVR covering the full design, this may cover also the mitigation means.

- (e) Several studies have shown that the amount of energy needed to cause fatal injuries, in the case of a direct hit, is extremely low (i.e. in the region of few dozen Joules.) The energy levels of operations addressed within this document are likely to be significantly higher, and therefore the retained harm is the potential for fatal injuries. By application of the methodology, the applicant has the opportunity to claim lower lethality either on a case-by-case basis, or systematically if allowed by the competent authorities (e.g. in the 'open' category).
- (f) Fatal injury is a well-defined condition and, in most countries, is known by the authorities. Therefore, the risk of under-reporting fatalities is almost non-existent. The quantification of the associated risk of fatality is straightforward. The usual means to measure fatalities is by the number of deaths within a particular time interval (e.g. the fatal accident rate per million flying hours), or the number of deaths for a specified circumstance (e.g. the fatal accident rate per number of take-offs).
- (g) Damage to critical infrastructure is a more complex condition. Therefore, the quantification of the associated risks may be difficult and subject to cooperation with the organisation responsible for the infrastructure.

2.2 SORA process outline

- (a) The SORA methodology provides a logical process to analyse the proposed ConOps and establish an adequate level of confidence that the operation can be conducted with an acceptable level of risk. There are ten steps that support the SORA methodology and each of these steps is described in the following paragraphs and further detailed, when necessary, in the relevant annexes.
- (b) The SORA focuses on the assessment of air and ground risks. In addition to air and ground risks, an additional risk assessment of critical infrastructure should also be performed. This should be done in cooperation with the organisation responsible for the infrastructure, as they are most knowledgeable of those threats. Figure 3 outlines the ten steps of the risk model, while Figure 4 provides an overall understanding of how to arrive at an air risk class (ARC) for a given operation.

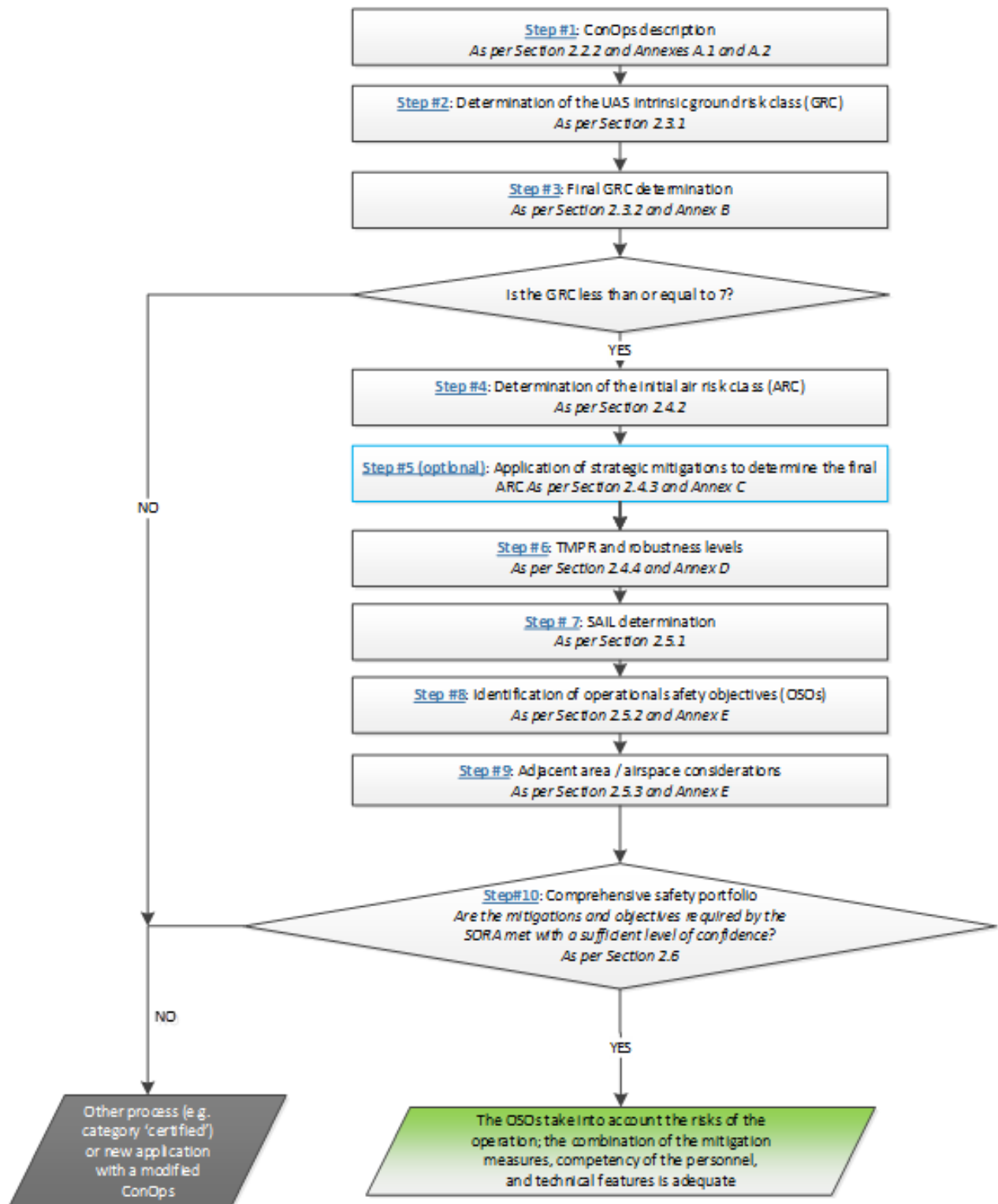


Figure 3 — The SORA process

Note: If operations are conducted across different environments, some steps may need to be repeated for each particular environment.

2.2.1 Pre-application evaluation

- (a) Before starting the SORA process, the applicant should verify that the proposed operation is feasible (i.e. not subject to specific exclusions from the competent authority or subject to an STS). Things to verify before beginning the SORA process are whether:
 - (1) the operation falls under the ‘open’ category;
 - (2) the operation is covered by a ‘standard scenario’ included in the appendix to the UAS Regulation or by a ‘predefined risk assessment’ published by EASA;
 - (3) the operation falls under the ‘certified’ category; or
 - (4) the operation is subject to a specific NO-GO from the competent authority.

If none of the above cases applies, the SORA process should be applied.

2.2.2 Step #1 — ConOps description

- (a) The first step of the SORA requires the applicant to collect and provide the relevant technical, operational and system information needed to assess the risk associated with the intended operation of the UAS. Annex A to this document provides a detailed framework for data collection and presentation. The ConOps description is the foundation for all other activities, and it should be as accurate and detailed as possible. The ConOps should not only describe the operation, but also provide insight into the UAS operator’s operational safety culture. It should also include how and when to interact with the ANSP. Therefore, when defining the ConOps, the UAS operator should give due consideration to all the steps, mitigations and OSOs provided in Figures 3 and 4.
- (b) Developing the ConOps can be an iterative process; therefore, as the SORA process is applied, additional mitigations and limitations may be identified, requiring additional associated technical details, procedures, and other information to be provided/updated in the ConOps. This should culminate in a comprehensive ConOps that fully and accurately describes the proposed operation as envisioned.

2.3 The ground risk process

2.3.1 Step #2 – Determination of the intrinsic UAS ground risk class (GRC)

- (a) The intrinsic UAS ground risk relates to the risk of a person being struck by the UAS (in the case of a loss of UAS control with a reasonable assumption of safety).
- (b) To establish the intrinsic GRC, the applicant needs the maximum UA characteristic dimension (e.g. the wingspan for a fixed-wing UAS, the blade diameter for rotorcraft, the maximum dimension for multi-copters, etc.) and the knowledge of the intended operational scenario.
- (c) The applicant needs to have defined the area at risk when conducting the operation (also called the ‘area of operation’) including:
 - (1) the operational volume, which is composed of the flight geography and the contingency volume. To determine the operational volume, the applicant should consider the position-keeping capabilities of the

UAS in 4D space (latitude, longitude, height and time). In particular, the accuracy of the navigation solution, the flight technical error¹ of the UAS and the path definition error (e.g. map errors), and latencies should be considered and addressed in this determination;

- (2) whether or not the area is a controlled ground area; and
 - (3) the associated ground risk buffer with at least a 1:1 rule², or for rotary wing UA, defined using a ballistic methodology approach acceptable to the competent authority.
- (d) Table 2 illustrates how to determine the intrinsic ground risk class (GRC). The intrinsic GRC is found at the intersection of the applicable operational scenario and the maximum UA characteristic dimension that drives the UAS lethal area. If there is a mismatch between the maximum UAS characteristic dimension and the typical kinetic energy expected, the applicant should provide substantiation for the chosen column.

Intrinsic UAS ground risk class				
Max UAS characteristics dimension	1 m / approx. 3 ft	3 m / approx. 10 ft	8 m / approx. 25 ft	>8 m / approx. 25 ft
Typical kinetic energy expected	< 700 J (approx. 529 ft lb)	< 34 kJ (approx. 25 000 ft lb)	< 1 084 kJ (approx. 800 000 ft lb)	> 1 084 kJ (approx. 800 000 ft lb)
Operational scenarios				
VLOS/BVLOS over a controlled ground area ³	1	2	3	4
VLOS over a sparsely populated area	2	3	4	5
BVLOS over a sparsely populated area	3	4	5	6
VLOS over a populated area	4	5	6	8
BVLOS over a populated area	5	6	8	10
VLOS over an assembly of people	7			
BVLOS over an assembly of people	8			

Table 2 — Determination of the intrinsic GRC

- (e) The operational scenarios describe an attempt to provide discrete categorisations of operations with increasing numbers of **people at risk**. In principle, it is possible to use either qualitative criteria (please refer to next point (f)) or quantitative criteria, or consider both criteria, to assess if an operation takes place over sparsely populated areas, populated areas, or assemblies of people.

¹ The flight technical error is the error between the actual track and the desired track (sometimes referred to as ‘the ability to fly the flight director’).

² If the UA is planned to operate at 120 m altitude, the ground risk buffer should at least be 120 m.

³ In line with Figure 1 and point 2.3.1(c), the controlled area should encompass the flight geography, the contingency volume, and the ground risk buffer.

- (f) Qualitative assessment: the volume to be used by the operator to classify the operation includes the operational volume and the ground risk buffer (as defined by a semantic model), which determine the intrinsic GRC.

GM1 Article 2(3) 'Definitions I DEFINITION OF 'ASSEMBLIES OF PEOPLE'' provides guidance on when an operation is classified as taking place over assemblies of people.

An operation should be classified as taking place over a populated area if the volume that is used to determine the intrinsic GRC:

- does not include assemblies of people, and
- includes areas that are substantially used for residential, commercial or recreational purposes.

- (g) EVLOS¹ operations are to be considered to be BVLOS for the intrinsic GRC determination.
- (h) Controlled ground areas² are a way to strategically mitigate the risk on ground (similar to flying in segregated airspace); the UAS operator should ensure, through appropriate procedures, that no uninvolved person is in the area of operation, as defined in Section 2.3.1(c).
- (i) An operation occurring in a populated environment cannot be intrinsically classified as being in a sparsely populated environment, even in cases where the footprint of the operation is completely within special risk areas (e.g. rivers, railways, and industrial estates). The applicant can make the claim for a lower density and/or shelter with Step #3 of the SORA process.
- (j) Operations that do not have a corresponding intrinsic GRC (i.e. grey cells on the table) are not supported by the SORA methodology.
- (k) When evaluating the typical kinetic energy expected for a given operation, the applicant should generally use the airspeed, in particular V_{cruise} for fixed-wing aircraft and the terminal velocity for other aircraft. Specific designs (e.g. gyrocopters) might need additional considerations. Guidance useful in determining the terminal velocity can be found at <https://www1.grc.nasa.gov/beginners-guide-to-aeronautics/termvel/>.
- (l) The nominal size of the crash area for most UAS can be anticipated by considering both the size and the energy used in the ground risk determination. There are certain cases or design aspects that are non-typical and will have a significant effect on the lethal area of the UAS, such as the amount of fuel, high-energy rotors/props, frangibility, material, etc. These may not have been considered in the intrinsic GRC determination table. These considerations may lead to a decrease/increase in the intrinsic GRC. The use of industry standards or dedicated research might provide a simplified path for this assessment.

2.3.2 Step #3 – Final GRC determination

¹ EVLOS — A UAS operation whereby the remote pilot maintains uninterrupted situational awareness of the airspace in which the UAS operation is being conducted via visual airspace surveillance through one or more human VOs, possibly aided by technological means. The remote pilot has direct control of the UAS at all times.

² See the definition in [Article 2\(21\)](#) of the UAS Regulation.

- (a) The intrinsic risk of a person being struck by the UAS (in case of a loss of control of the operation) can be controlled and reduced by means of mitigation.
- (b) The mitigations used to modify the intrinsic GRC have a direct effect on the safety objectives associated with a particular operation, and therefore it is important to ensure their robustness. This has particular relevance for technical mitigations associated with the ground risk (e.g. an emergency parachute).
- (c) The final GRC determination (step #three) is based on the availability of these mitigations to the operation. Table 3 provides a list of potential mitigations and the associated relative correction factor. A positive number denotes an increase in the GRC, while a negative number results in a decrease in the GRC. All the mitigations should be applied in numeric sequence to perform the assessment. Annex B provides additional details on how to estimate the robustness of each mitigation. Competent authorities may define additional mitigations and the relative correction factors.

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

Table 3 — Mitigations for final GRC determination

- (d) When applying mitigation M1, the GRC cannot be reduced to a value lower than the lowest value in the applicable column in Table 2. This is because it is not possible to reduce the number of people at risk below that of a controlled area.
- (e) For example, in the case of a 2.5 m UAS (second column in Table 2) flying in visual line-of-sight (VLOS) over a sparsely populated area, the intrinsic GRC is 3. Upon analysis of the ConOps, the applicant claims to reduce the ground risk by first applying M1 at medium robustness (a GRC reduction of 2). In this case, the result of applying M1 is a GRC of 2, because the GRC cannot be reduced any lower than the lowest value for that column. The applicant then applies M2 using a parachute system, resulting in a further reduction of 1 (i.e. a GRC of 1). Finally, M3 (the ERP) has been developed to medium robustness with no further reduction as per Table 3.
- (f) The final GRC is established by adding all the correction factors (i.e. $-1-1-0=-2$) and adapting the GRC by the resulting number ($3-2=1$).

¹ This mitigation is meant as a means to reduce the number of people at risk.

² This mitigation is meant as a means to reduce the energy absorbed by the people on the ground upon impact.

- (g) If the final GRC is greater than 7, the operation is not supported by the SORA process.
- (h) In general, a quantitative approach to mitigation means allows to reduce the intrinsic GRC by 1 point if the mitigation means reduce the risk of the operation by a factor of approximately 10 (90 % reduction) compared to the risk that is assessed before the mitigation means are applied. Such quantitative criteria should be used to validate the risk reduction that is claimed when applying Annex B to AMC1 to Article 11.

2.4 The air risk process

2.4.1 Air risk process overview

- (a) The SORA uses the operational airspace defined in the ConOps as the baseline to evaluate the intrinsic risk of a mid-air collision, and by determining the air risk category (ARC). The ARC may be modified/lowered by applying strategic and tactical mitigation means. The application of strategic mitigations may lower the ARC level. An example of strategic mitigations to reduce the risk of a collision may be by operating during certain time periods or within certain boundaries. After applying the strategic mitigations, any residual risk of a mid-air collision is addressed by means of tactical mitigations.
- (b) Tactical mitigations take the form of detect and avoid (DAA) systems or alternate means, such as ADS-B, FLARM, U-space services or operational procedures. Depending on the residual risk of a mid-air collision, the tactical mitigation performance requirement(s) (TMPR(s)) may vary.
- (c) As part of the SORA process, the UAS operator should cooperate with the relevant service provider for the airspace (e.g. the ANSP or U-space service provider) and obtain the necessary authorisations. Additionally, generic local authorisations or local procedures allowing access to a certain portion of controlled airspace may be used if available (e.g. the Low Altitude Authorization and Notification Capability – LAANC – system in the United States).
- (d) Irrespective of the results of the risk assessment, the UAS operator should pay particular attention to all the features that may increase the detectability of the UA in the airspace. Therefore, technical solutions that improve the electronic conspicuousness or detectability of the UAS are recommended.

2.4.2 Step #4 - Determination of the initial air risk class (ARC)

- (a) The competent authority, ANSP, or U-space service provider, may elect to directly map the airspace collision risks using airspace characterisation studies. These maps would directly show the initial ARC for a particular volume of airspace. If the competent authority, ANSP, or U-space service provides an air collision risk map (static or dynamic), the applicant should use that service to determine the initial ARC, and go directly to Section 2.4.3 ‘Application of strategic mitigations’ to reduce the initial ARC.
- (b) As seen in Figure 4, the airspace is categorised into 13 aggregated collision risk categories. These categories were characterised by the altitude,

controlled versus uncontrolled airspace, airport/heliport versus non-airport/non-heliport environments, airspace over urban versus rural environments, and lastly atypical (e.g. segregated) versus typical airspace.

- (c) To assign the proper ARC for the type of UAS operation, the applicant should use the decision tree found in Figure 4.

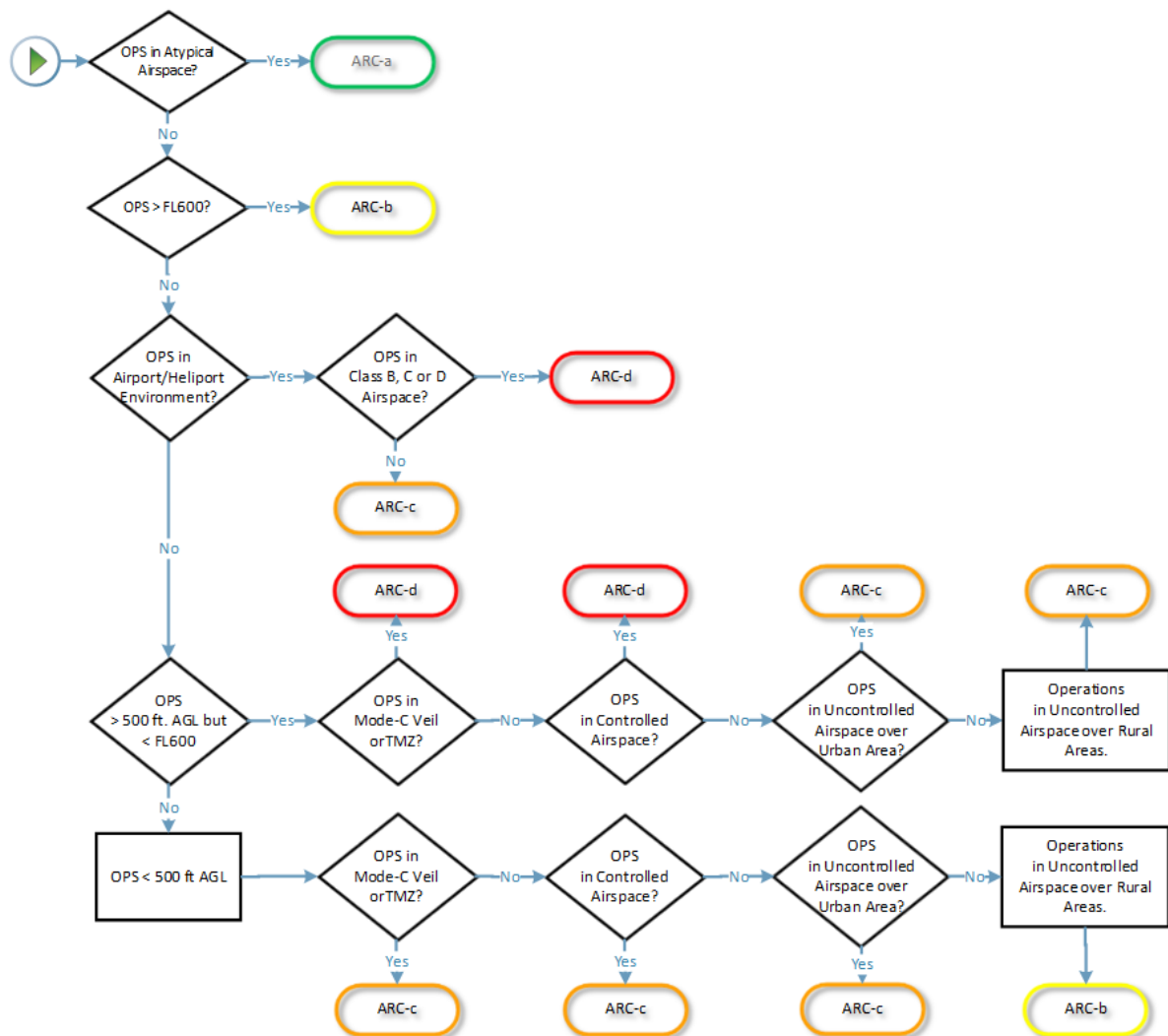


Figure 4 — ARC assignment process

- (d) The ARC is a qualitative classification of the rate at which a UAS would encounter a manned aircraft in typical generalised civil airspace. The ARC is an initial assignment of the aggregated collision risk for the airspace, before mitigations are applied. The actual collision risk of a specific local operational volume could be much different, and can be addressed with the application of strategic mitigations to reduce the ARC (this step is optional, see Section 2.4.3, Step #5).
- (e) Although the static generalised risk put forward by the ARC is conservative (i.e. it stays on the safe side), there may be situations where that conservative assessment may not suffice. It is important for both the

competent authority and the UAS operator to take great care to understand the operational volume and under which circumstances the definitions in Figure 4 could be invalidated. In some situations, the competent authority may raise the operational volume ARC to a level which is greater than that advocated by Figure 4. The ANSP should be consulted to ensure that the assumptions related to the operational volume are accurate.

- (f) ARC-a is generally defined as airspace where the risk of a collision between a UAS and a manned aircraft is acceptable without the addition of any tactical mitigation.
- (g) ARC-b, ARC-c, ARC-d generally define volumes of airspace with increasing risk of a collision between a UAS and a manned aircraft.
- (h) During the UAS operation, the operational volume may span many different airspace environments. The applicant needs to perform an air risk assessment for the entire range of the operational volume. An example scenario of operations in multiple airspace environments is provided at the end of Annex C.

2.4.3 Step #5 — Application of strategic mitigations to determine the residual ARC (optional)

- (a) As stated before, the ARC is a generalised qualitative classification of the rate at which a UAS would encounter a manned aircraft in the specific airspace environment. However, it is recognised that the UAS operational volume may have a different collision risk from the one that the generalised initial ARC assigned.
- (b) If an applicant considers that the generalised initial ARC assigned is too high for the condition in the local operational volume, then they should refer to Annex C for the ARC reduction process.
- (c) If the applicant considers that the generalised initial ARC assignment is correct for the condition in the local operational volume, then that ARC becomes the residual ARC.

2.4.4 Step #6 — TMPR and robustness levels

Tactical mitigations are applied to mitigate any residual risk of a mid-air collision that is needed to achieve the applicable airspace safety objective. Tactical mitigations will take the form of either 'see and avoid' (i.e. operations under VLOS), or they may require a system which provides an alternate means of achieving the applicable airspace safety objective (operation using a DAA, or multiple DAA systems). Annex D provides the method for applying tactical mitigations.

2.4.4.1 Operations under VLOS/EVLOS

- (a) VLOS is considered to be an acceptable tactical mitigation for collision risk for all ARC levels. Notwithstanding the above, the UAS operator is advised to consider additional means to increase the situational awareness with regard to air traffic operating in the vicinity of the operational volume.
- (b) Operational UAS flights under VLOS do not need to meet the TMPR, nor the TMPR robustness requirements. In the case of multiple segments of the flight, those segments conducted under VLOS do not

have to meet the TMPR, nor the TMPR robustness requirements, whereas those conducted under BVLOS do need to meet the TMPR and the TMPR robustness requirements.

- (c) In general, all VLOS requirements are applicable to EVLOS. EVLOS may have additional requirements over and above those of VLOS. The EVLOS verification and communication latency between the remote pilot and the observers should be less than 15 seconds.
- (d) Notwithstanding the above, the applicant should have a documented VLOS de-confliction scheme, in which the applicant explains which methods will be used for detection, and defines the associated criteria applied for the decision to avoid incoming traffic. If the remote pilot relies on detection by observers, the use of phraseology will have to be described as well.
- (e) For VLOS operations, it is assumed that an observer is not able to detect traffic beyond 2 NM. (Note that the 2 NM range is not a fixed value and it may largely depend on the atmospheric conditions, aircraft size, geometry, closing rate, etc.). Therefore, the UAS operator may have to adjust the operation and/or the procedures accordingly.

2.4.4.2 Operations under a DAA system — TMPR

- (a) For operations other than VLOS, the applicant will use the residual ARC and Table 4 below to determine the TMPR.

Residual ARC	TMPRs	TMPR level of robustness
ARC-d	High	High
ARC-c	Medium	Medium
ARC-b	Low	Low
ARC-a	No requirement	No requirement

Table 4 — TMPRs and TMPR level of robustness assignment

- (b) High TMPR (ARC-d): This is airspace where either the manned aircraft encounter rate is high, and/or the available strategic mitigations are low. Therefore, the resulting residual collision risk is high, and the TMPR is also high. In this airspace, the UAS may be operating in integrated airspace and will have to comply with the operating rules and procedures applicable to that airspace, without reducing the existing capacity, decreasing safety, negatively impacting current operations with manned aircraft, or increasing the risk to airspace users or persons and property on the ground. This is no different from the requirements for the integration of comparable new and novel technologies in manned aviation. The performance level(s) of those tactical mitigations and/or the required variety of tactical mitigations are generally higher than for the other ARCs. If operations in this airspace are conducted more routinely, the competent authority is expected to require the UAS operator to comply with the recognised DAA system standards (e.g. those developed by RTCA SC-228 and/or EUROCAE WG-105).

- (c) Medium TMPR (ARC-c): A medium TMPR will be required for operations in airspace where the chance of encountering manned aircraft is reasonable, and/or the strategic mitigations available are medium. Operations with a medium TMPR will likely be supported by the systems currently used in aviation to aid the remote pilot in the detection of other manned aircraft, or by systems designed to support aviation that are built to a corresponding level of robustness. Traffic avoidance manoeuvres could be more advanced than for a low TMPR.
- (d) Low TMPR (ARC-b): A low TMPR will be required for operations in airspace where the probability of encountering another manned aircraft is low, but not negligible, and/or where strategic mitigations address most of the risk, and the resulting residual collision risk is low. Operations with a low TMPR are supported by technology that is designed to aid the remote pilot in detecting other traffic, but which may be built to lower standards. For example, for operations below 120 m, the traffic avoidance manoeuvres are expected to mostly be based on a rapid descent to an altitude where manned aircraft are not expected to ever operate.
- (e) No performance requirement (ARC-a): This is airspace where the manned aircraft encounter rate is expected to be extremely low, and therefore there is no requirement for a TMPR. It is generally defined as airspace where the risk of a collision between a UAS and a manned aircraft is acceptable without the addition of any tactical mitigation. An example of this may be UAS flight operations in some parts of Alaska or northern Sweden, where the manned aircraft density is so low that the airspace safety threshold could be met without any tactical mitigation.
- (f) Annex D provides information on how to satisfy the TMPR based on the available tactical mitigations and the TMPR level of robustness.

2.4.4.3 Consideration of additional airspace/operational requirements

- (a) Modifications to the initial and subsequent approvals may be required by the competent authority or the ANSP as safety and operational issues arise.
- (b) The UAS operator and the competent authority need to be cognisant that the ARCs are a generalised qualitative classification of the collision risk. Local circumstances could invalidate the aircraft density assumptions of the SORA, for example, due to special events. It is important for both the competent authority and the UAS operator to fully understand the airspace and air-traffic flows, and develop a system which can alert UAS operators to changes to the airspace on a local level. This will allow the UAS operator to safely address the increased risks associated with these events.
- (c) There are many airspace, operational and equipment requirements which have a direct impact on the collision risk of all aircraft in the airspace. Some of these requirements are general and apply to all volumes of airspace, while some are local and are required only for a particular volume of airspace. The SORA cannot possibly cover all the

possible requirements for all the conditions in which the UAS operator may wish to operate. The applicant and the competent authority need to work closely together to define and address these additional requirements.

- (d) The SORA process should not be used to support operations of a UAS in a given airspace without the UAS being equipped with the required equipment for operations in that airspace (e.g. the equipment required to ensure interoperability with other airspace users). In these cases, specific exemptions may be granted by the competent authority. Those exemptions are outside the scope of the SORA.
- (e) Operations in controlled airspace, an airport/heliport environment or a Mode-C Veil/transponder mandatory zone (TMZ) will likely require prior approval from the ANSP. The applicant should ensure that they involve the ANSP/authority prior to commencing operations in these environments.

2.5 Final assignment of specific assurance and integrity level (SAIL) and OSO

2.5.1 Step #7 SAIL determination

- (a) The SAIL parameter consolidates the ground and air risk analyses, and drives the required activities. The SAIL represents the level of confidence that the UAS operation will remain under control.
- (b) After determining the final GRC and the residual ARC, it is then possible to derive the SAIL associated with the proposed ConOps.
- (c) The level of confidence that the operation will remain under control is represented by the SAIL. The SAIL is not quantitative, but instead corresponds to:
 - (1) the OSO to be complied with (see Table 6);
 - (2) the description of the activities that might support compliance with those objectives; and
 - (3) the evidence that indicates that the objectives have been satisfied.
- (d) The SAIL assigned to a particular ConOps is determined using Table 5:

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 5 — SAIL determination

2.5.2 Step #8 — Identification of the operational safety objectives (OSOs)

- (a) The last step of the SORA process is to use the SAIL to evaluate the defences within the operation in the form of OSOs, and to determine the associated level of robustness. Table 6 provides a qualitative methodology to make this determination. In this table, O is optional, L is recommended with low robustness, M is recommended with medium robustness, and H is recommended with high robustness. The various OSOs are grouped based on the threat they help to mitigate; hence, some OSOs may be repeated in the table.
- (b) Table 6 is a consolidated list of the common OSOs that historically have been used to ensure safe UAS operations. It represents the collected experience of many experts, and is therefore a solid starting point to determine the required safety objectives for a specific operation. The competent authorities that issue the operational authorisation may define additional OSOs for a given SAIL and the associated level of robustness.

OSO number (in line with Annex E)		SAIL					
		I	II	III	IV	V	VI
	Technical issue with the UAS						
OSO#01	Ensure the UAS 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#04	UAS developed to authority recognised design standards ¹	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 and current and able to control the abnormal situation	L	L	M	M	H	H
OSO#10	Safe recovery from a technical issue	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

¹ In the case of experimental flights that investigate new technical solutions, the competent authority may accept that recognised standards are not met.

OSO number (in line with Annex E)		SAIL					
		I	II	III	IV	V	VI
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 trained and 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
OSO#20	A human factors evaluation has been performed and the human machine interface (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 6 — Recommended OSOs

2.5.3 Step #9 – Adjacent area/airspace considerations

- (a) The objective of this section is to address the risk posed by a loss of control of the operation, resulting in an infringement of the adjacent areas on the ground and/or adjacent airspace. These areas may vary with different flight phases.
- (b) Safety requirements for ‘basic containment’ are:

No probable¹ failure² of the UAS or any external system supporting the operation should lead to operation outside the operational volume.

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

- *the design and installation features (independence, separation and redundancy);*

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

Note: Independence, separation and redundancy are not necessarily required, but they may be useful to substantiate the robustness of the containment system.

- *any relevant particular risk (e.g. hail, ice, snow, electromagnetic interference, etc.) associated with the ConOps.*

The competent authority may accept a declaration for the claimed integrity. The applicant declares that the required level of integrity has been achieved and supporting evidence is available.

- (c) The enhanced containment applies to operations conducted:
- (1) either where the adjacent areas:
 - (i) contain assemblies of people¹ unless the UAS is already approved for operations over assemblies of people; or
 - (ii) are ARC-d unless the residual ARC of the airspace area intended to be flown within the operational volume is already ARC-d;
 - (2) Or where the operational volume is in a populated area where:
 - (i) M1 mitigation has been applied to lower the GRC; or
 - (ii) operating in a controlled ground area.
- (d) The enhanced containment consists in the following safety requirements:

- (a) The UAS is designed to standards that are considered adequate by the competent authority and/or in accordance with a means of compliance that is acceptable to that authority such that:
 - (1) the probability of the UA leaving the operational volume should be less than 10^{-4} /FH; and
 - (2) no single failure* of the UAS or any external system supporting the operation should lead to its operation outside the ground risk buffer.

Compliance with the requirements above should be substantiated by analysis and/or test data with supporting evidence.
- (b) Software (SW) and airborne electronic hardware (AEH) whose development error(s) could **directly** (refer to Note 2) lead to operations outside the ground risk buffer should be developed to an industry standard or methodology that is recognised as being adequate by EASA.

For UA with maximum characteristic dimensions not greater than 3 m, operated up to SAIL II operations, the competent authority may accept a declaration from the applicant

¹ See the definition in [Article 2\(3\)](#) of the UAS Regulation.

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

for the compliance with the MoC to Light-UAS.2511¹. For UAS configurations exceeding the applicability of such MoC², the competent authority may decide to still accept declarations based on such MoC with evidence available, or to accept appropriate MoC proposed by the applicant. Otherwise, the competent authority may request the applicant to use a UAS for which EASA has verified the claimed integrity.

As it is not possible to anticipate all local situations, the UAS operator, the competent authority and the ANSP should use sound judgement with regard to the definition of the 'adjacent airspace' as well as the 'adjacent areas'. For example, for a small UAS with a limited range, these definitions are not intended to include busy airport/heliport environments 30 kilometres away. The airspace bordering the UAS volume of operation should be the starting point of the determination of the adjacent airspace. In exceptional cases, the airspace beyond those volumes that border the UAS volume of operation may also have to be considered.

Note 1: The safety requirements as proposed in this section cover both the integrity and assurance levels.

Note 2: The third safety requirement in Section 2.5.3(c) does not imply a systematic need to develop the SW and AEH according to an industry standard or methodology recognised as adequate by the competent authority. The use of the term 'directly' means that a development error in a software or an airborne electronic hardware would lead the UA outside the ground risk buffer without the possibility for another system to prevent the UA from exiting the operational volume.

2.6 Step #10 — comprehensive safety portfolio

- (a) The SORA process provides the applicant, the competent authority and the ANSP with a methodology which includes a series of mitigations and safety objectives to be considered to ensure an adequate level of confidence that the operation can be safely conducted. These are:
 - (1) mitigations used to modify the intrinsic GRC;
 - (2) strategic mitigations for the initial ARC;
 - (3) tactical mitigations for the residual ARC;
 - (4) adjacent area/airspace considerations; and
 - (5) OSOs.
- (b) The satisfactory substantiation of the mitigations and objectives required by the SORA process provides a sufficient level of confidence that the proposed operation can be safely conducted.
- (c) The UAS operator should be sure to address any additional requirements that were not identified by the SORA process (e.g. for security, environmental protection, etc.) and identify the relevant stakeholders (e.g. environmental protection agencies, national security bodies, etc.). The activities performed within the SORA process will likely address those additional needs, but they may not be considered to be sufficient at all times.

¹ [Final Means of Compliance with Light-UAS.2511 MOC Light-UAS.2511-01 - Issue 01 | EASA \(europa.eu\)](#)

² EASA is developing MoC applicable to different UAS configurations. Until these are available, the competent authority may define means of compliance for special configurations (e.g. tethered drones) where a DVR may not be appropriate.

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- (d) The UAS operator should ensure the consistency between the SORA safety case and the actual operational conditions (i.e. at the time of the flight).

Annex A to AMC1 to Article 11

ED Decision 2019/021/R

CONOPS: GUIDELINES ON COLLECTING AND PRESENTING SYSTEM AND OPERATIONAL INFORMATION FOR SPECIFIC UAS OPERATIONS

A.0 General guidelines

This document must be original work completed and understood by the applicant (operator). Applicants must take responsibility for their own safety cases, whether the material originates from this template or otherwise.

A.0.1 Document control

Applicants should include an amendment record at the beginning of the document to record changes and show how that the document is controlled.

Amendment/ Revision/ Issue Number	Date	Amended by	Signed
a, b, c or 1, 2, 3 etc.	DDMMYYYY	Name of the person carrying out the amendment/ revision/ issue number	Signature of person carrying out the amendment/ revision/ issue number

This section is critical to ensure appropriate document control.

Any significant changes to the ConOps may require further assessment and approval by the competent authority prior to further operations being conducted.

A.0.2 References

- (a) List all references (documents, URL, manuals, appendices) mentioned in the ConOps:

#	Title	Description	Amendment/ Revision/ Issue Number
[1]			
[2]			

A.1 Guidance for the collection and presentation of operationally relevant information

The template below provides section headings detailing the subject areas that should be addressed when producing the ConOps, for the purposes of demonstrating that a UAS operation can be conducted safely. The template layouts as presented are not prescriptive, but the subject areas detailed should be included in the ConOps documentation as required for the particular operation(s), in order to provide the minimum required information and evidence to perform the SORA.

A.1.1 Reserved

A.1.2 Organisation overview

- (a) This section describes how the organisation is defined, to support safe operations. It should include:
- (1) the structure of the organisation and its management, and
 - (2) the responsibilities and duties of the UAS operator.

A.1.2.1 Safety

- (a) The 'specific' category covers operations where the operational risks are higher and therefore the management of safety is particularly important. The applicant should describe how safety is integrated in the organisation, and the safety management system that is in place, if applicable.
- (b) Any additional safety-related information should be provided.

A.1.2.2 Design and production

- (a) If the organisation is responsible for the design and/or production of the UAS, this section should describe the design and/or the production organisation.
- (b) It should provide information on the manufacturer of the UAS to be used if the UAS is not manufactured or produced by the operator, i.e. by a third-party manufacturer.
- (c) If required, information on the production organisation of the third-party organisation should be provided as evidence.

A.1.2.3 Training of staff involved in operations

This section should describe the training organisation or entity that qualifies all the staff involved in operations with respect to the ConOps.

A.1.2.4 Maintenance

This section should describe:

- (a) the general maintenance philosophy of the UAS;
- (b) the maintenance procedures for the UAS; and
- (c) the maintenance organisation, if required.

A.1.2.5 Crew

This section should describe:

- (a) the responsibilities and duties of personnel, including all the positions and people involved, for functions such as:
 - (1) the remote pilot (including the composition of the flight team according to the nature of the operation, its complexity, the type of UAS, etc.); and
 - (2) support personnel (e.g. visual observers (VOs), launch crew, and recovery crew);
- (b) the procedure for multi-crew coordination if more than one person is directly involved in the flight operations;
- (c) the operation of different types of UAS, including details of any limitations to the types of UAS that a remote pilot may operate, if appropriate; and
- (d) details of the operator's policy on crew health requirements, including any procedures, guidance or references to ensure that the flight team are appropriately fit, capable and able to conduct the planned operations.

A.1.2.6 UAS configuration management

This section should describe how the operator manages changes to the UAS configuration.

A.1.2.7 Other position(s) and other information

Any other position defined in the organisation, or any other relevant information, should be provided.

A.1.3 Operations

A.1.3.1 Type of operations

- (a) Detailed description of the ConOps: the applicant should describe what types of operations the UAS operator intends to carry out. The detailed description should contain all the information needed to obtain a detailed understanding of how, where and under which limitations or conditions the operations shall be performed. The operational volume, including the ground and air risk buffers, needs to be clearly defined. Relevant charts/diagrams, and any other information helpful to visualise and understand the intended operation(s) should be included in this section.
- (b) The applicant should provide specific details on the type of operations (e.g. VLOS, BVLOS), the population density to be overflown (e.g. away from people, sparsely populated, assemblies of people) and the type of airspace to be used (e.g. a segregated area, fully integrated).
- (c) The applicant should describe the level of involvement (LoI) of the crew and any automated or autonomous systems during each phase of the flight.

A.1.3.2 Normal operation strategy

- (a) The normal operation strategy should contain all the safety measures, such as technical or procedural measures, crew training, etc. that are put in place to ensure that the UAS can fulfil the operation within the approved limitations, and so that the operation remains in control.
- (b) Within this section, it should be assumed that all systems are working normally and as intended.
- (c) The intent of this chapter is to provide a clear understanding of how the operation takes place within the approved technical, environmental, and procedural limitations.

A.1.3.3 Standard operating procedures

This section should describe the standard operating procedures (SOP) applicable to all operations for which an approval is requested. A reference to the applicable operations manual (OM) is acceptable. Note: Checklists and SOP templates may be provided by the local competent authority or a qualified entity.

A.1.3.3.1 Normal operating procedures

This section should describe the normal operating procedures in place for the intended operations.

A.1.3.3.2 Contingency and emergency procedures

This section should describe the contingency procedures in place for any malfunction or abnormal operation, as well as an emergency.

A.1.3.3.3 Occurrence reporting procedures

UAS, like all aircraft, are subject to accident investigations and occurrence reporting schemes. Mandatory or voluntary reporting should be carried out using the reporting processes provided by the competent authorities. As a minimum, the SOP should contain:

- (a) reporting procedures in case of:
 - (1) damage to property;
 - (2) a collision with another aircraft; or
 - (3) a serious or fatal injury (third parties and own personnel); and
- (b) documentation and data logging procedures: describe how records and information are stored and made available, if required, to the accident investigation body, competent authority, and other government entities (e.g. police) as applicable.

A.1.3.4 Operational limits

This section should detail the specific operating limitations and conditions appropriate to the proposed operation(s); for example, operating heights, horizontal distances, weather conditions, the applicable flight performance envelope, times of operations (day and/or night) and any limitations for operating within the applicable class(es) of airspace, etc.

A.1.3.5 Emergency response plan (ERP)

The applicant should:

- (a) define a response plan for use in the event of a loss of control of the operation;
- (b) describe the procedures to limit the escalating effects of a crash; and
- (c) describe the procedures for use in the event of a loss of containment.

A.1.4 Remote crew training

A.1.4.1 General information

This section describes the processes and procedures that the UAS operator uses to develop and maintain the necessary competence for the remote crew (i.e. any person involved in the UAS operation).

A.1.4.2 Initial training and qualification

This section describes the processes and procedures that the UAS operator uses to ensure that the remote crew is suitably competent, and how the qualification of the remote crew is carried out.

A.1.4.3 Procedures for maintenance of currency

This section describes the processes and procedures that the UAS operator uses to ensure that the remote crew acquire and maintain the required currency to execute the various types of duties.

A.1.4.4 Flight simulation training devices (FSTDs)

This section:

- (a) describes the use of FSTDs for acquiring and maintaining the practical skills of the remote pilots (if applicable); and
- (b) describes the conditions and restrictions in connection with such training (if applicable).

A.1.4.5 Training programme

This section provides a reference to the applicable training programme(s) for the remote crew.

A2 Guidance for the collection and presentation of technical relevant information

The aim of this section is to collect all the necessary technical information about the UAS and its supporting systems. This information needs to be sufficient to address the required robustness levels of the mitigations and the OSOs of the SORA.

The list below is suggested guidance for items which may be relevant for this assessment, but the items may differ, depending on the specific UAS utilised in this ConOps.

A.2.1 Reserved

A.2.2 UAS description

A.2.2.1 Unmanned aircraft (UA) segment

A.2.2.1.1 Airframe

This section should include the following:

- (a) A detailed description of the physical characteristics of the UA (mass, centre-of-mass, dimensions, etc.), including photos, diagrams and schematics, if appropriate to support the description of the UA.
 - (1) Dimensions: for fixed-wing UA, the wingspan, fuselage length, body diameter etc.; for a rotorcraft, the length, width and height, propeller diameter, etc.;
 - (2) Mass: all the relevant masses such as the empty mass, MTOM, etc.; and
 - (3) Centre of gravity: the centre of gravity and limits if necessary.
- (b) Materials: the main materials used and where they are used in the UA, highlighting in particular any new materials (new metal alloys or composites) or combinations of materials (composites 'tailored' to designs).
- (c) Load limits: the capability of the airframe structure to withstand expected flight load limits.
- (d) Sub-systems: any sub-systems such as a hydraulic system, environmental control system, parachute, brakes, etc.

A.2.2.1.2 UA performance characteristics

This section should include the following:

- (a) the performance of the UA within the proposed flight envelope, specifically addressing at least the following items:
 - (1) Performance: the
 - (i) maximum altitude;
 - (ii) maximum endurance;
 - (iii) maximum range;
 - (iv) maximum rate of climb;
 - (v) maximum rate of descent;
 - (vi) maximum bank angle; and
 - (vii) turn rate limits.
 - (2) Airspeeds: the
 - (i) slowest speed attainable;
 - (ii) stall speed (if applicable);
 - (iii) nominal cruise speed;
 - (iv) max cruise speed; and
 - (v) never-exceed airspeed.
- (b) Any performance limitations due to environmental and meteorological conditions, specifically addressing the following items:
 - (1) wind speed limitations (headwind, crosswind, gusts);
 - (2) turbulence restrictions;
 - (3) rain, hail, snow, ash resistance or sensitivities;
 - (4) the minimum visibility conditions, if applicable;
 - (5) outside air temperature (OAT) limits; and
 - (6) in-flight icing:
 - (i) whether the proposed operating environment includes operations in icing conditions;
 - (ii) whether the system has an icing detection capability, and if so, what indications, if any, the system provides to the remote pilot, and/or how the system responds; and
 - (iii) any icing protection capability of the UA, including any test data that demonstrates the performance of the icing protection system.

A.2.2.1.3 Propulsion system

This section should include the following:

- (a) Principle

A description of the propulsion system and its ability to provide reliable and sufficient power to take off, climb, and maintain flight at the expected mission altitudes.

(b) Fuel-powered propulsion systems

- (1) The type (manufacturer organisation and model) of engine that is used;
- (2) How many engines are installed;
- (3) The type and the capacity of fuel that is used;
- (4) How the engine performance is monitored;
- (5) The status indicators, alerts (such as warning, caution and advisory), messages that are provided to the remote pilot;
- (6) A description of the most critical propulsion-related failure modes/conditions and their impact on the operation of the system;
- (7) How the UA responds, and the safeguards that are in place to mitigate the risk of a loss of engine power for each of the following:
 - (i) fuel starvation;
 - (ii) fuel contamination;
 - (iii) failed signal input from the remote pilot station (RPS); and
 - (iv) engine controller failure;
- (8) The in-flight restart capabilities of the engine, if applicable, and if so, a description of the manual and/or automatic features of this capability;
- (9) The fuel system and how it allows for adequate control of the fuel delivery to the engine, and provides for aircrew determination of the fuel remaining. This includes a system level diagram showing the location of the system in the UA and the fuel flow path; and
- (10) How the fuel system is designed in terms of safety (fire detection and extinguishing, reduction of risk in case of impact, leak prevention, etc.).

(c) Electric-powered propulsion systems

- (1) A high-level description of the electrical distribution architecture, including items such as regulators, switches, buses, and converters, as necessary;
- (2) The type of motor that is used;
- (3) The number of motors that are installed;
- (4) The maximum continuous power output of the motor in watts;
- (5) The maximum peak power output of the motor in watts;

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- (6) The current range of the motor in amps;
 - (7) Whether the propulsion system has a separate electrical source, and if not, how the power is managed with respect to the other systems of the UA;
 - (8) A description of the electrical system and how it distributes adequate power to meet the requirements of the receiving systems. This should include a system level diagram showing the electrical power distribution throughout the UA;
 - (9) How power is generated on board the UA (for example, generators, alternators, batteries).
 - (10) If a limited life power source such as batteries is used, the useful life of the power source during normal and emergency conditions, and how this was determined;
 - (11) How information on the battery status and the remaining battery capacity is provided to the remote pilot or the watchdog system;
 - (12) If available, a description of the source(s) of backup power for use in the event of a loss of the primary power source. This should include:
 - (i) the systems that are powered during backup power operation;
 - (ii) a description of any automatic or manual load shedding; and
 - (iii) how much operational time the backup power source provides, including the assumptions used to make this determination;
 - (13) How the performance of the propulsion system is monitored;
 - (14) The status indicators and alert (such as warning, caution and advisory) messages that are provided to the remote pilot;
 - (15) A description of the most critical propulsion-related failure modes/conditions and their impact on system operation;
 - (16) How the UA responds, and the safeguards that are in place to mitigate the risk of a propulsion system loss for each of the following:
 - (i) Low battery charge;
 - (ii) A failed signal input from the RPS; and
 - (iii) A motor controller failure;
 - (17) If the motor has in-flight reset capabilities, a description of the manual and/or automatic features of this capability.
- (d) Other propulsion systems

A description of these systems to a level of detail equivalent to the fuel and electrical propulsions sections above.

A.2.2.1.4 Flight control surfaces and actuators

This section should include the following:

- (a) A description of the design and operation of the flight control surfaces and servos/actuators, including a diagram showing the location of the control surfaces and the servos/actuators;
- (b) A description of any potential failure modes and the corresponding mitigations;
- (c) How the system responds to a servo/actuator failure; and
- (d) How the remote-pilot or watchdog system is alerted of a servo/actuator malfunction.

A.2.2.1.5 Sensors

This section should describe the non-payload sensor equipment on board the UA and its role.

A.2.2.1.6 Payloads

This section should describe the payload equipment on board the UA, including all the payload configurations that significantly change the weight and balance, electrical loads, or flight dynamics.

A.2.3 UAS control segment

This section should include the following:

A.2.3.1 General

An overall system architecture diagram of the avionics architecture, including the location of all air data sensors, antennas, radios, and navigation equipment. A description of any redundant systems, if available.

A.2.3.2 Navigation

- (a) How the UAS determines its location;
- (b) How the UAS navigates to its intended destination;
- (c) How the remote pilot responds to instructions from:
 - (1) air traffic control;
 - (2) UA observers or VOs (if applicable); and
 - (3) other crew members (if applicable);
- (d) The procedures to test the altimeter navigation system (position, altitude);
- (e) How the system identifies and responds to a loss of the primary means of navigation;
- (f) A description of any backup means of navigation; and
- (g) How the system responds to a loss of the secondary means of navigation, if available.

A.2.3.3 Autopilot

- (a) How the autopilot system was developed, and the industry or regulatory standards that were used in the development process.
- (b) If the autopilot is a commercial off-the-shelf (COTS) product, the type/design and the production organisation, with the criteria that were used in selecting the COTS autopilot.
- (c) The procedures used to install the autopilot and how its correct installation is verified, with references to any documents or procedures provided by the manufacturer's organisation and/or developed by the UAS operator's organisation.
- (d) If the autopilot employs input limit parameters to keep the aircraft within defined limits (structural, performance, flight envelope, etc.), a list of those limits and a description of how these limits were defined and validated.
- (e) The type of testing and validation that was performed (software-in-the-loop (SITL) and hardware-in-the-loop (HITL) simulations).

A.2.3.4 Flight control system

- (a) How the control surfaces (if any) respond to commands from the flight control computer/autopilot.
- (b) A description of the flight modes (i.e. manual, artificial-stability, automatic, autonomous).
- (c) Flight control computer/autopilot:
 - (1) If there are any auxiliary controls, how the flight control computer interfaces with the auxiliary controls, and how they are protected against unintended activation.
 - (2) A description of the flight control computer interfaces required to determine the flight status and to issue appropriate commands.
 - (3) The operating system on which the flight controls are based.

A.2.3.5 Remote pilot station (RPS)

- (a) A description or a diagram of the RPS configuration, including screen captures of the control station displays.
- (b) How accurately the remote pilot can determine the attitude, altitude (or height) and position of the UA.
- (c) The accuracy of the transmission of critical parameters to other airspace users/air traffic control (ATC).
- (d) The critical commands that are safeguarded from inadvertent activation and how that is achieved (for example, is there a two-step process to command 'switch the engine off'). The kinds of inadvertent input that the remote pilot could enter to cause an undesirable outcome (for example, accidentally hitting the 'kill engine' control in flight).
- (e) Any other programmes that run concurrently on the ground control computer, and if there are any, the precautionary measures that are used to ensure that flight-critical processing will not be adversely affected.

- (f) The provisions that are made against an RPS display or interface lock-up.
- (g) The alerts (such as warning, caution and advisory) that the system provides to the remote pilot (e.g. low fuel or battery level, failure of critical systems, or operation out of control).
- (h) A description of the means to provide power to the RPS, and redundancies, if any.

A.2.3.6 Detect and avoid (DAA) system

- (a) Aircraft conflict avoidance
 - (1) A description of the system/equipment that is installed for collaborative conflict avoidance (e.g. SSR, TCAS, ADS-B, FLARM, etc.).
 - (2) If the equipment is qualified, details of the detailed qualification to the respective standard.
 - (3) If the equipment is not qualified, the criteria that were used in selecting the system.
- (b) Non-collaborative conflict avoidance:
A description of the equipment that is installed (e.g. vision-based, PSR data, LIDAR, etc.).
- (c) Obstacle conflict avoidance
A description of the system/equipment that is installed, if any, for obstacle collision avoidance.
- (d) Avoidance of adverse weather conditions
A description of the system/equipment that is installed, if any, for the avoidance of adverse weather conditions.
- (e) Standard
 - (1) If the equipment is qualified, a list of the detailed qualification to the respective standard.
 - (2) If the equipment is not qualified, the criteria that were used in selecting the system.
- (f) A description of any interface between the conflict avoidance system and the flight control computer.
- (g) A description of the principles that govern the installed DAA system
- (h) A description of the role of the remote pilot or any other remote crew in the DAA system.
- (i) A description of the known limitations of the DAA system.

A.2.4 Containment system

- (a) A description of the principles of the system/equipment used to perform containment functions for:
 - (1) avoidance of specific area(s) or volume(s); or
 - (2) confinement in a given area or volume.

- (b) The system information and, if applicable, supporting evidence that demonstrates the reliability of the containment system.

A.2.5 Ground support equipment (GSE) segment

- (a) A description of all the support equipment that is used on the ground, such as launch or recovery systems, generators, and power supplies.
- (b) A description of the standard equipment available, and the backup or emergency equipment.
- (c) A description of how the UAS is transported on the ground.

A.2.6 Command and control (C2) link segment

- (a) The standard(s) with which the system is compliant.
- (b) A detailed diagram that shows the system architecture of the C2 link, including informational or data flows and the performance of the subsystem, and values for the data rates and latencies, if known.
- (c) A description of the control link(s) connecting the UA to the RPS and any other ground systems or infrastructures, if applicable, specifically addressing the following items:
 - (1) The spectrum that will be used for the control link and how the use of this spectrum has been coordinated. If approval of the spectrum is not required, the regulation that was used to authorise the frequency.
 - (2) The type of signal processing and/or link security (i.e. encryption) that is employed.
 - (3) The datalink margin in terms of the overall link bandwidth at the maximum anticipated distance from the RPS, and how it was determined.
 - (4) If there is a radio signal strength and/or health indicator or similar display to the remote pilot, how the signal strength and health values were determined, and the threshold values that represent a critically degraded signal.
 - (5) If the system employs redundant and/or independent control links, how different the design is, and the likely common failure modes.
 - (6) For satellite links, an estimate of the latencies associated with using the satellite link for aircraft control and for air traffic control communications.
 - (7) The design characteristics that prevent or mitigate the loss of the datalink due to the following:
 - (i) RF or other interference;
 - (ii) flight beyond the communications range;
 - (iii) antenna masking (during turns and/or at high attitude angles);
 - (iv) a loss of functionality of the RPS;
 - (v) a loss of functionality of the UA; and
 - (vi) atmospheric attenuation, including precipitation.

A.2.7 C2 link degradation

A description of the system functions in case of a C2 link degradation:

- (a) Whether the C2 link degradation status is available and in what form (e.g. degraded, critical, automatic messages).
- (b) How the status of the C2 link degradation is announced to the remote pilot (e.g. visual, haptic, or sound).

A description of the associated contingency procedures.

- (c) Other.

A.2.8 C2 link loss

- (a) The conditions that could lead to a loss of the C2 link.
- (b) The measures in case of a loss of the C2 link.
- (c) A description of the clear and distinct aural and visual alerts to the remote pilot for any case of a lost link.
- (d) A description of the established lost link strategy presented in the UAS operating manual, taking into account the emergency recovery capability.
- (e) A description of how the geo-awareness or geo-fencing system is used in this case, if available.
- (f) The lost link strategy, and, if incorporated, the re-acquisition process in order to try to re-establish the link in a reasonably short time.

A.2.9. Safety features

- (a) A description of the single failure modes and their recovery mode(s), if any.
- (b) A description of the emergency recovery capability to prevent risks to third-parties. This typically consists of:
 - (1) a flight termination system (FTS), procedure or function that aims to immediately end the flight; or
 - (2) an automatic recovery system (ARS) that is implemented through UAS crew command or by the on board systems. This may include an automatic pre-programmed course of action to reach a predefined and unpopulated forced landing area; or
 - (3) any combination of the above, or other methods.
- (c) The applicant should provide both a functional and physical diagram of the global UA system with a clear depiction of its constituent components, and, where applicable, an indication of its peculiar features (e.g. independent power supplies, redundancies, etc.)

Annex B to AMC1 to Article 11

ED Decision 2023/012/R

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

B.1 How to use Annex B

The following Table B-1 provides the basic principles to consider when using SORA Annex B.

	Principle description	Additional information
#1	Annex B provides assessment criteria for the integrity (i.e. safety gain) and assurance (i.e. method of proof) of the applicant's proposed mitigations. The proposed mitigations are intended to reduce the intrinsic ground risk class (GRC) associated with a given operation.	The identification of mitigations is the responsibility of the applicant.
#2	Annex B does not cover the Lol of the competent authority. The Lol is based on the competent authority's assessment of the applicant's ability to perform the given operation.	
#3	A proposed mitigation may or may not have a positive effect in reducing the ground risk associated with a given operation. In the case where a mitigation is available but does not reduce the risk on the ground, its level of integrity should be considered equivalent to 'None'.	
#4	To achieve a given level of integrity/assurance, when more than one criterion exists for that level of integrity/assurance, all the applicable criteria need to be met.	
#5	Annex B intentionally uses non-prescriptive terms (e.g. suitable, reasonably practicable) to provide flexibility to both the applicant and the competent authorities. This does not constrain the applicant in proposing mitigations, nor the competent authority in evaluating what is needed on a case-by-case basis.	
#6	This annex in its entirety also applies to single-person organisations.	

Table B.1 – Basic principles

B.2 M1 — Strategic mitigations for ground risk

M1 mitigations are 'strategic mitigations' intended to reduce the number of people at risk on the ground. To assess the integrity levels of M1 mitigations, the following need to be considered:

- (a) the definition of the ground risk buffer and the resulting ground footprint; and
- (b) the evaluation of the people at risk.

With the exception of the specific case of a 'tether' provided in the following paragraph (2), the generic criteria to assess the level of integrity (Table B.2) and level of assurance (Table B.3) of the M1 type ground risk mitigations are provided in following paragraph (1).

(1) Generic criteria

		Level of integrity		
		Low	Medium	High
M1 — Strategic mitigations for ground risk	Criterion #1 (Definition of the ground risk buffer)	A ground risk buffer with at least a 1:1 rule ¹ or for rotary wing UA defined using a ballistic methodology approach acceptable to the competent authority.	The ground risk buffer takes into consideration: (a) improbable ² single malfunctions or failures (including the projection of high energy parts such as rotors and propellers) which would lead to an operation outside the operational volume; (b) meteorological conditions (e.g. wind); (c) UAS latencies (e.g. latencies that affect the timely manoeuvrability of the UA); (d) UA behaviour when activating a technical containment measure; and (e) UA performance.	Same as medium ³
	Comments	¹ If the UA is planned to operate at an altitude of 150 m, the ground risk buffer should be a minimum of 150 m.	² For the purpose of this assessment, the term 'improbable' should be interpreted in a qualitative way as 'Unlikely to occur in each UAS during its total life, but which may occur several times when considering the total operational life of a number of UAS of this type'. ³ The distinction between a medium and a high level of robustness for this criterion is achieved through the level of assurance (Table 3 below).	
	Criterion #2 (Evaluation of people at risk)	The applicant evaluates the area of operations by means of on-site inspections or appropriate appraisals to justify lowering the density of the people at risk (e.g. a residential area during daytime when some people may not be present or an industrial area at night time for the same reason).	The applicant evaluates the area of operations by use of authoritative density data (e.g. data from the U-space data service provider) relevant for the proposed area and time of operation to substantiate a lower density of people at risk. If the applicant claims a reduction, due to a sheltered operational environment, the applicant: (a) uses a UA of less than 25 kg and not flying above 174 knots ⁴ , and (b) demonstrates that although the operation is conducted in a populated environment, it is reasonable to consider that most of the non-involved persons will be located within a building ⁵ .	Same as medium.
	Comments	N/A	⁴ as per MITRE presentation given during the UAS Technical Analysis and Applications Center (TAAC) conference in 2016 titled 'UAS EXCOM Science and Research Panel (SARP) 2016 TAAC Update' - PR 16-3979 ⁵ The consideration of this mitigation may vary based on the local conditions.	N/A

Table B.2 — Level of integrity assessment criteria for ground risk of non-tethered M1 mitigations

		Level of assurance		
		Low	Medium	High
M1 — Strategic mitigations for ground risk	Criterion #1 (Definition of the ground risk buffer)	The applicant declares that the required level of integrity is achieved ¹ .	The applicant has supporting evidence to claim that the required level of integrity has been achieved. This is typically done by means of testing, analysis, simulation ² , inspection, design review or through operational experience.	The claimed level of integrity is validated by the competent authority of the MS or by an entity that is designated by the competent authority.
	Comments	¹ Supporting evidence may or may not be available.	² When simulation is used, the validity of the targeted environment used in the simulation needs to be justified.	N/A
	Criterion #2 (Evaluation of people at risk)	The applicant declares that the required level of integrity has been achieved ³ .	The density data used for the claim of risk reduction is an average density map for the date/time of the operation from a static sourcing (e.g. census data for night time ops). In addition, for localised operations (e.g. intra-city delivery or infrastructure inspection), the applicant submits the proposed route/area of operation to the applicable authority (e.g. city police, office of civil protection, infrastructure owner etc.) to verify the claim of a reduced number of people at risk.	Same as medium; however, the density data used for the claim of risk reduction is a near-real time density map from a dynamic sourcing (e.g. cellular user data) and applicable for the date/time of the operation.
	Comments	³ Supporting evidence may or may not be available	N/A	N/A

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

(2) Specific criteria in case of use of a tether to reduce people at risk

When an applicant wants to take credit for a tether to justify a reduction in the number of people at risk:

- (a) the tether needs to be considered part of the UAS and assessed based on the criteria below, and
- (b) potential hazards created by the tether itself should be addressed through the OSOs defined in Annex E.

The level of integrity criteria for a tethered mitigation is found in Table B.4. The level of assurance for a tethered mitigation is found in Table B.5.

		Level of integrity		
		Low	Medium	High
M1 — Tethered operation	Criterion #1 (Technical design)	Does not meet the 'medium' level criteria	(a) The length of the line is adequate to contain the UA in the operational volume and reduce the number of people at risk. (b) The strength of the line is compatible with the ultimate loads ¹ expected during the operation. (c) The strength of the attachment points is compatible with the ultimate loads ¹ expected during the operation. (d) The tether cannot be cut by the rotating propellers.	Same as medium ²
	Comments	N/A	¹ Ultimate loads are identified as the maximum loads to be expected in service, including all the possible nominal and failure scenarios multiplied by a 1.5 safety factor. ² The distinction between a medium and a high level of robustness for this criterion is achieved through the level of assurance (Table B.5 below).	
	Criterion #2 (Procedures)	Does not meet the 'medium' level criteria	The applicant has procedures to install and periodically inspect the condition of the tether.	Same as medium ³
	Comments	N/A	³ The distinction between a medium and a high level of robustness for this criterion is achieved through the level of assurance (Table B.5 below).	

Table B.4 — Level of integrity assessment criteria for ground risk tethered M1 mitigations

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

		authority of the MS. (b) The adequacy of the procedures and checklists is declared.	(1) dedicated flight tests; or (2) simulation, provided that the representativeness of the simulation means is proven to be valid for the intended purpose with positive results; or (3) any other means acceptable to the competent authority of the MS.	(b) The procedures, flight tests and simulations are validated by the competent authority of the MS or by an entity that is designated by the competent authority.
	Comments	N/A	¹ AMC2 UAS.SPEC.030(3)(e) (Operational procedures for medium and high levels of robustness) is considered an acceptable means of compliance.	N/A

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

B.3 M2 — Effects of ground impact are reduced

M2 mitigations are intended to reduce the effect of ground impact once the control of the operation is lost. This is done by reducing the effect of the UA impact dynamics (i.e. the area, energy, impulse, transfer energy, etc.). One example would be the use of a parachute.

		Level of integrity		
		Low/None	Medium	High
M2 — Effects of UA impact dynamics are reduced (e.g. parachute)	Criterion #1 (Technical design)	Does not meet the 'medium' level criterion	(a) Effects of impact dynamics and post impact hazards ¹ are significantly reduced although it can be assumed that a fatality may still occur. (b) When applicable, in case of malfunctions, failures or any combinations thereof that may lead to a crash, the UAS contains all the elements required for the activation of the mitigation. (c) When applicable, any failure or malfunction of the proposed mitigation itself (e.g. inadvertent activation) does not adversely affect the safety of the operation.	Same as medium. In addition: (a) When applicable, the activation of the mitigation is automated ² . (b) The effects of impact dynamics and post impact hazards are reduced to a level where it can be reasonably assumed that a fatality will not occur ³ .
	Comments	N/A	¹ Examples of post impact hazards include fires and the release of high-energy parts.	² The applicant retains the discretion to implement an additional manual activation function. ³ Emerging research and upcoming industry standards will help applicants to substantiate compliance with this integrity criterion.
	Criterion #2 (Procedures, if applicable)	Any equipment used to reduce the effect of the UA impact dynamics is installed and maintained in accordance with the manufacturer's instructions. ⁴		

	Comments / Notes	⁴ The distinction between a low, a medium and a high level of robustness for this criterion is achieved through the level of assurance (Table B.7 below).
	Criterion #3 (Training, if applicable)	Personnel responsible for the installation and maintenance of the measures proposed to reduce the effect of the UA impact dynamics are identified and trained by the applicant. ⁵
	Comments / Notes	⁵ The distinction between a low, a medium and a high level of robustness for this criterion is achieved through the level of assurance (Table B.7 below).

Table B.6 — Level of integrity assessment criteria for M2 mitigations

		Level of assurance		
		Low/None	Medium	High
M2 — Effects of UA impact dynamics are reduced (e.g. parachute)	Criterion #1 (Technical design)	The applicant declares that the required level of integrity has been achieved ¹ .	The applicant has supporting evidence to claim that the required level of integrity is achieved. This is typically ² done by means of testing, analysis, simulation ³ , inspection, design review or through operational experience. The applicant may declare compliance with MoC to Light-UAS.2512 ⁴ providing the supporting evidence defined in it.	The competent authority should request the applicant to use a UAS for which EASA has verified the claimed integrity through a DVR.
	Comments	¹ Supporting evidence may or may not be available.	² The use of industry standards is encouraged when developing mitigations used to reduce the effect of ground impact. ³ When simulation is used, the validity of the targeted environment used in the simulation needs to be justified. ⁴ https://www.easa.europa.eu/en/document-library/product-certification-consultations/means-compliance-mitigation-means-m2-ref-amc	
	Criterion #2 (Procedures, if applicable)	(a) Procedures do not require validation against either a standard or a means of compliance considered adequate by the competent authority of the MS. (b) The adequacy of the procedures	(a) Procedures are validated against standards considered adequate by the competent authority of the MS and/or in accordance with the means of compliance acceptable to that authority ¹ . (b) The adequacy of the procedures is proven through: (1) dedicated flight tests; or (2) simulation, provided that the representativeness of the simulation means is proven to be valid for the intended	Same as medium. In addition: (a) Flight tests performed to validate the procedures cover the complete flight envelope or are proven to be conservative. (b) The procedures, flight tests and simulations are validated by the competent authority of the MS or by an entity

		and checklists is declared.	purpose with positive results; or (3) any other means acceptable to the competent authority of the MS	that is designated by the competent authority.
	Comments	N/A	¹ AMC2 UAS.SPEC.030(3)(e) (Operational procedures for medium and high levels of robustness) is considered an acceptable means of compliance.	N/A
	Criterion #3 (Training, if applicable)	Training is self-declared (with evidence available)	(a) Training syllabus is available. (b) The UAS operator provides competency-based, theoretical and practical training.	(a) Training syllabus is validated by the competent authority of the MS or by an entity that is designated by the competent authority. (b) Remote crew competencies are verified by the competent authority of the MS or by an entity that is designated by the competent authority.
	Comments	N/A	N/A	N/A

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

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

An ERP should be defined by the applicant in the event of a loss of control of the operation (*). These are emergency situations where the operation is in an unrecoverable state and in which:

- (a) the outcome of the situation relies highly on providence; or
- (b) it could not be handled by a contingency procedure; or
- (c) when there is a grave and imminent danger of fatalities.

The ERP proposed by an applicant is different from the emergency procedures. The ERP is expected to cover:

- (1) a plan to limit the escalating effect of a crash (e.g. to notify first responders), and
- (2) the conditions to alert ATM.

(*) Refer to the SORA semantic model (Figure 1) in the main body.

		Level of integrity		
		Low/None	Medium	High
M3 — An ERP is in place, UAS operator validated and effective	Criteria	No ERP is available, or the ERP does not cover the elements identified to meet a 'medium' or 'high' level of integrity	The ERP: (a) is suitable for the situation; (b) limits the escalating effects; (c) defines criteria to identify an emergency situation; (d) is practical to use; (e) clearly delineates the duties of remote crew member(s).	Same as medium. In addition, in case of a loss of control of the operation, the ERP is shown to significantly reduce the number of people at risk, although it can be assumed that a fatality may still occur.
	Comments	N/A	N/A	N/A

Table B.8 — Level of integrity assessment criteria for M3 mitigations

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

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

Annex C to AMC1 to Article 11

ED Decision 2023/012/R

STRATEGIC MITIGATION — COLLISION RISK ASSESSMENT

C.1 Introduction — air risk strategic mitigations

The target audience for Annex C is the UAS operator who wishes to demonstrate to the competent authority that the risk of a mid-air collision in the operational volume is acceptably safe, and to obtain, with concurrence from the ANSP, approval to operate in the particular airspace.

More particularly, this Annex C covers the process of how the UAS operator justifies lowering the initial assessment of the ARC.

The air risk model provides a holistic means to assess the risk of an encounter with manned aircraft. This provides guidance to both the UAS operator and the competent authority on determining whether an operation can be conducted in a safe manner. The model does not provide answers to all the air risk challenges, and should not be used as a checklist. This guidance provides the UAS operator with suitable mitigation means and thereby reduces the air risk to an acceptable level. This guidance does not contain prescriptive requirements, but rather a set of objectives at various levels of robustness.

C.2 Principles

The SORA is only used to establish an initial ARC for an operational volume when the competent authority has not already established one. The initial ARC is a generalised qualitative classification of the rate at which a UAS would encounter a manned aircraft in the operational volume. A residual ARC is the classification after mitigations are applied. The UAS operational volume may have collision risk levels that differ from the generalised initial ARC level. If this is assumed to be the case, this Annex provides a process to help the UAS operator and the competent authority work to lower the initial ARC through the application of strategic mitigations.

C.3 Air risk scope and assumptions

The scope of this air risk assessment is designed to help the UAS operator and the competent authority in determining the risk of a collision with manned aircraft which are operated under the 'specific' category. The scope of the air risk assessment does not include:

- (a) the probability of UAS on UAS encounters; or
- (b) risks due to wake turbulence, adverse weather, controlled flight into terrain, return-to-course functions, a lost link, or an automatic response.

C.3.1 SORA qualitative vs quantitative approach

This air risk assessment is qualitative in nature. Where possible, this assessment will use quantitative data to back up and support the qualitative assumptions. The SORA approach in general provides a balance between qualitative and quantitative approaches, as well as between known prescriptive and non-traditional methodologies.

C.3.2 SORA U-space assumptions

The SORA has used U-space mitigations to a limited extent, because U-space is in the early stages of development. When U-space provides adequate mitigations to limit the

risk of UAS encounters with manned aircraft, a UAS operator can apply for, and obtain credit for these mitigations, whether they are tactical or strategic.

C.3.3 SORA flight rules assumptions

Today, UAS flight operations under the ‘specific’ category cannot fully comply with the IFR and VFR rules as written. Although IFR infrastructures and mitigations are designed for manned aircraft operations (e.g. minimal safe altitudes, equipage requirements, operational restrictions, etc.), it may be possible for a UAS to comply with the IFR requirements. UAS operating at very low levels (e.g. operational volume’s ceiling below 150m (~500 ft) AGL) may technically comply with the IFR requirements, but the IFR infrastructure was not designed with that airspace in mind; therefore, mitigations for this airspace would be derived, and would be highly impractical and inefficient. When operating BVLOS, a UAS cannot comply with VFR¹.

Given the above, for the purposes of this risk assessment, it is assumed that the competent authority will address these shortcomings. All aircraft must adhere to specific flight rules to mitigate the collision risk, in accordance with Regulation (EU) No 923/2012² (the standardised European rules of the air (SERA) Regulation). The implementation of procedures and guidelines appropriate to the airspace structure reduces the collision risk for all aircraft. For instance, there are equipment requirements established for the airspace requested and requirements associated with day-night operations, pilot training, airworthiness, lighting requirements, altimetry requirements, airspace restrictions, altitude restrictions, etc. These rules must still be addressed by the competent authority.

The Member State is responsible for defining the airspace structures in accordance with Regulation (EU) 2017/373; in addition, as required in [Article 15](#) of the UAS Regulation, the Member State will define the geographical zones for UAS operators. The Member State, when defining the airspace structure, considers the traffic type and complexity and defines the airspace classes and services being provided in accordance with the SERA. This information, which can be published either in the aeronautical information publication (AIP) or any other aeronautical publication, can be used by the UAS operator to identify the initial air risk. The SORA air risk model is a tool to assess the risks associated with UAS operations in a particular volume of airspace, and a method to determine whether those risks are within acceptable safety limits.

C.3.4 Regulatory requirements, safety requirements, and waivers

The SERA Regulation requires all aircraft, manned and UAS, to ‘remain well clear from and avoid collisions with’ other manned aircraft. The UAS is unable to ‘see and avoid’, therefore, it must employ an alternate means of compliance to meet the intent of ‘see and avoid’, which will have to be defined in terms of safety and performance for the UAS operation. When the risk of an encounter with manned aircraft is extremely low (i.e. in atypical/segregated airspace), an alternate means of compliance may not be required. For example, in areas where the manned airspace density is so low, (e.g. in the case of low-level operations in remote parts of Alaska or northern Sweden), the airspace safety threshold could be met with no additional mitigation. UAS operators need to understand that although the airspace may be technically safe to fly in from an air collision risk

¹ A UAS operating under VLOS may be able to comply with VFR.

² Commission Regulation (EU) No 923/2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation and amending Implementing Regulation (EU) No 1035/2011 and Regulations (EC) No 1265/2007, (EC) No 1794/2006, (EC) No 730/2006, (EC) No 1033/2006 and (EU) No 255/2010, OJ L 281, 13.10.2012, p.1.

standpoint, it does not fulfil point SERA.3201 of the SERA Regulation, or the ICAO Annex 2, Section 3.2 'See and Avoid' requirements.

To operate a UAS in manned airspace, two requirements must be met:

- (a) A safety requirement that ensures that the operation is safe to conduct in the operational volume; and
- (b) A requirement for compliance with point SERA.3201 of the SERA Regulation to 'see and avoid'.

These requirements must be addressed to the competent authority through either:

- (1) demonstration of compliance with both requirements;
- (2) demonstration of an alternate means of compliance with the requirements; or
- (3) a waiver of the requirement(s) by the competent authority.

The SORA provides a means to assess whether the air risks associated with UAS operations is within acceptable limits.

C.3.5 SORA assumptions on threat aircraft

This air risk assessment does not consider the ability of the threat aircraft to remain well clear from or to avoid collisions with the UAS in any part of the safety assessment.

C.3.6 SORA assumptions on people-carrying UAS

This air risk model does not consider the notion of UAS carrying people, or urban mobility operations. The model and the assessment criteria are limited to the risk of an encounter with manned aircraft, i.e. an aircraft piloted by a human on board.

C.3.7 SORA assumptions on UAS lethality

This air risk assessment assumes that a mid-air collision between a UAS and manned aircraft is catastrophic. Frangibility is not considered.

C.3.8 SORA assertion on tactical mitigations

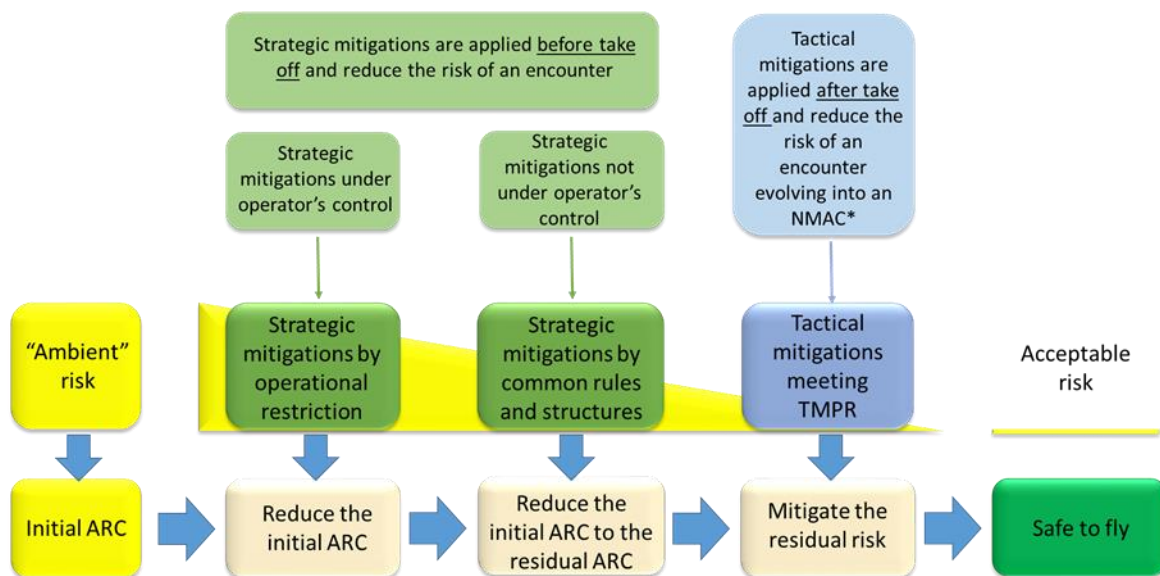
The SORA model makes no distinction between separation provision and collision avoidance but treats them as one dependent system performing a continuous function, whose goals and objectives change over time. This continuum starts with an encounter and progresses to a near mid-air collision objective as the pilot and/or the detect and avoid system of the UA negotiate(s) the encounter. The use of the term 'tactical mitigation' should therefore not be confused with the provisioning of (tactical) separation services referred to in ICAO Doc 9854.

C.4 General air-SORA mitigation overview

SORA classification of mitigations

The SORA classifies mitigations to suit the operational needs of a UAS in the 'specific' class. These mitigations are classified as:

- (a) strategic mitigations by the application of operational restrictions;
- (b) strategic mitigations by the application of common structures and rules; and
- (c) tactical mitigations.



* NMAC: near mid-air collision

Figure C.5 — SORA air conflict mitigation process

C.5 Air risk strategic mitigation

Strategic mitigation consists of procedures and operational restrictions intended to reduce the UAS encounter rates or the time of exposure, prior to take-off.

Strategic mitigations are further divided into:

- mitigations by operational restrictions which are mitigations that are controlled¹ by the UAS operator; and
- mitigations by common structures² and rules which are mitigations which cannot be controlled by the UAS operator.

C.5.1 Strategic mitigation by operational restrictions

Operational restrictions are controlled by the UAS operator and are intended to mitigate the risk of a collision prior to take-off. This section provides details on operational restrictions, and examples of how these can be applied to UAS operations.

Operational restrictions are the primary means that a UAS operator can apply to reduce the risk of collision using strategic mitigation(s). The most common mitigations by operational restriction are:

- mitigation(s) that bound the geographical volume in which the UAS operates (e.g. certain boundaries or airspace volumes); and
- mitigation(s) that bound the operational time frame (e.g. restricted to certain times of day, such as flying only at night).

¹ The usage of the word 'controlled' means that the UAS operator is not reliant on the cooperation of other airspace users to implement an effective operational restriction mitigation strategy.

² This usage of the word 'structure' means air structure, airways, traffic procedures and the like.

In addition to the above, another approach to limit exposure to risk is to limit the exposure time. This is called ‘mitigation by exposure’. Mitigation by exposure simply limits the time of exposure to the operational risk.

Mitigations that limit the flight time or the exposure time to risk may be more difficult to apply. With this said, there is some precedence for this mitigation, which has (in some cases) been accepted by the competent authority. Therefore, even though it is considered to be difficult, this mitigation strategy may be considered.

One example is the minimum equipment list (MEL) system, which allows, in certain situations, a commercial airline to fly for three to ten days with an inoperative traffic collision avoidance system (TCAS). The safety argument is that three days is a very short exposure time compared with the total life-time risk exposure of the aircraft. This short time of elevated risk exposure is justified to allow the aircraft to return to a location where proper equipment maintenance can take place. While appreciating that this may be a difficult argument for the UAS operation to make, the UAS operator is still free to pursue this line of reasoning for a reduction in the risk of collision by applying a time of exposure argument.

C.5.1.1. Example of operational restriction by geographical boundary

The UAS operator intends to fly in a Class B airport airspace. The Class B airspace, as a whole, has a very high encounter rate. However, the UAS operator wishes to operate at a very low altitude and at the very outer reaches of the Class B airspace where manned aircraft do not routinely fly. The UAS operator draws up a new operational volume at the outer edge of the class B airspace and demonstrates that operations within the new Class B volume have very low encounter rates.

The UAS operator may approach this scenario by requesting the competent authority to more precisely define the airport environment from the SORA perspective. The UAS operator then considers the newly defined airport environment, and provides an operational restriction that allows the UAS operation to safely remain inside the class B airspace, but outside the newly defined SORA airport environment.

C.5.1.2 Example of operational restriction by time limitations

The UAS operator wishes to fly in a Class B airport airspace. The Class B airspace, as a whole, has a very high encounter rate. However, the UAS operator wishes to operate at a time of day when manned aircraft do not routinely fly. The UAS operator then restricts the time schedule of the UAS operation and demonstrates that the new time (e.g. 03:00 / 3 AM and still within Class B) has very low encounter rates and is safe for operation.

C.5.1.3 Example of operational restriction by time of exposure

The UAS operator wishes to cut the corner of a Class B airspace for flight efficiency. The UAS operator demonstrates that even though the Class B airspace has a high encounter rate, the UAS is only exposed to that higher rate for a very short amount of time as it transitions the corner.

C.5.2 Strategic mitigation by common structures¹ and rules

¹ This usage of the word ‘structure’ means air structure, airways, traffic procedures and the like.

Strategic mitigation by common structures and rules requires all aircraft within a certain class of airspace to follow the same structures and rules; these structures and rules work to lower the risk of collision within the airspace. In accordance with the SERA Regulation, all aircraft in that airspace must participate, and only the competent authorities have the authority to set requirements for those aircraft, while the ANSP and ATCO provide instructions. The UAS operator does not have control¹ over the existence or level of participation of the airspace structure or the application of the flight rules. Therefore, strategic mitigation by common structures and rules is applied by the competent authorities. These should be made available to the UAS operator through the geographical zones, defined in accordance with [Article 15](#) of the UAS Regulation.

For example, imagine the situation if individual drivers could create their own driving rules to cover their direction, lanes, boundaries and speed. If the driving rules were different from one driver to another, no safety benefit would be gained, even though they were all following rules (their own), and total chaos would ensue. However, if all drivers were compelled to follow the same set of rules, then the traffic flow would be orderly, with increased safety for all drivers. This is why a UAS operator cannot propose a mitigation schema requiring participation from other airspace users that differs from that required by the competent authority.

Most strategic mitigations by common structures and rules will take the form of:

- (a) common flight rules; and
- (b) common airspace structures.

Strategic mitigations by common flight rules is accomplished by setting a common set of rules which all airspace users must comply with. These rules reduce air conflicts and/or make conflict resolution easier. Examples of common flight rules that reduce the collision risk include right of way rules, implicit and explicit coordination schemes, conspicuity requirements, cooperative identification system, etc.

Strategic mitigation by using a common airspace structure is accomplished by controlling the airspace infrastructure through physical characteristics, procedures, and techniques that reduce conflicts or make conflict resolution easier. Examples of common flight airspace structures which reduce the risk of collision are airways, departure and approach procedures, airflow management, etc.

In the future, as U-space structures and rules become more readily defined and adopted, they will provide a source for the strategic mitigation of UAS operations by common structures and rules that UAS operators could more easily apply.

C.5.2.1 Example of mitigation by common flight rules

The UAS operator intends to fly in a volume of airspace in which the competent authority requires all UAS to be equipped with an electronic cooperative system² and anti-collision lighting. The rules further require the UAS operator to file a flight plan with the designated ANSP/U-space service providers, and check for potential hazards along the whole flight route. The operator complies with these requirements and installs anti-collision lights and a Mode-S Transponder. The

¹ The usage of the words 'does not control' means that the UAS operator does not have control over the implementation of aviation structures and rules and is reliant on the competent authority to implement structures and rules.

² The installation of an electronic cooperative system would make the UAS a cooperative aircraft in accordance with FAA Interim Operational Approval Guidance 08-01, 'Unmanned Aircraft Systems Operations in the U.S. National Airspace System,' Federal Aviation Administration, FAA/AIR-160, 2008.

operator further agrees to file a flight plan prior to each flight. These rules enhance the safety of the flight in the same way as a notice to airmen (NOTAM). The UAS operator should also have a system in place to check for high airspace usage in the intended operational volume (e.g. a glider competition or a fly-in). In those situations where the UAS operator does not own the airspace in which the operational volume exists, the rules require the UAS operator to request permission prior to entering that airspace.

C.5.2.2. Examples of mitigation by common airspace structure

Example 1: The competent authority establishes a transit corridor through Class B airspace that keeps the UAS separated from other non-UAS airport traffic, and safely separates the corridor traffic in one direction from the traffic in the other direction. The UAS operator intends to fly through this Class B airport airspace, and hence must stay within the established transit corridor and adhere to the transit corridor rules.

Example 2: The UAS operator intends to fly a UAS from one location to another, and files a flight plan with a U-space service provider or the procedural separation system. As the UAS takes off, the U-space service provider then guarantees separation by procedural control of all the aircraft in the airspace. Procedural controls are the take-off windows, reporting points, assigned airways and altitudes, route clearances, etc. required for safe operation.

C.6 Reducing the initial air risk class (ARC) assignment (optional)

This section is intended for an applicant that intends to use strategic mitigations to reduce the collision risk (i.e. ARC). There are two types of ARC:

- (a) the initial ARC, which is a qualitative classification of a UAS operational collision risk within an operational volume before strategic mitigations are applied; and
- (b) the residual ARC, which is a qualitative classification of a UAS operational collision risk in an operational volume after all strategic mitigations are applied.

If a UAS operator agrees that the (generalised) initial ARC applicable to their operation and operational volume is correct, then this step is not necessary, and the assessment should continue at SORA Step #6 (assigning the DAA tactical performance requirement and robustness levels based on the residual collision risk).

If mitigations to reduce the ARC are relevant and are proposed, this section provides information and examples of how to use strategic mitigation(s) to lower the collision risk within the operational volume, and demonstrate the strategy to a competent authority. The examples within the SORA may or may not be applicable or acceptable to the competent authority; however, the SORA encourages an open dialogue between the applicant and the competent authority to determine what is acceptable evidence.

C.6.1 Lowering the initial ARC to the residual ARC-a in any operational volume (optional)

ARC-a is intended for operations in atypical/segregated airspace (see Table C.1). Lowering the initial ARC to residual ARC-a requires a higher level of safety verification because it allows a UAS operator to operate without any tactical mitigation.

To demonstrate that an operation could be reduced to a residual ARC-a, the UAS operator should demonstrate:

- (a) that the operational volume can meet the requirements of SORA atypical/segregated airspace; and
- (b) compliance with any other requirements mandated by the competent authority for the intended operational volume.

A residual ARC-a assessment does necessarily exempt the UAS operator from the requirements to 'see and avoid' and to 'remain well clear from' other aircraft. If the designated competent authority allows the UAS operator a residual ARC-a assessment for the operational volume, in order to comply with the SERA Regulation, the UAS operator must either provide a valid means and equipment as an alternate means of compliance for the 'see and avoid' requirement, or the competent authority must waive the requirement to 'see and avoid' and 'remain well clear.'

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

There may be many methods by which a UAS operator may wish to demonstrate a suitable air risk and strategic mitigations. The SORA does not dictate how this is achieved, and instead, allows the applicant to propose and demonstrate the suitability and effectiveness of their strategic mitigations. It is important for both the UAS operator and the competent authority to understand that the assessment may be qualitative in nature, and where possible, augmented with quantitative data to support the qualitative assumptions and decisions. The UAS operator and the competent authority should understand there may not be a clear delineation of the decision points, so common sense and the safety of manned aircraft should be of paramount consideration.

The SORA provides a two-step method to reduce the air risk by operational mitigation. The first step is to determine the initial ARC by using the potential air risk encounter rate based on known airspace densities (as per Table C.1). The second step is to reduce the initial risk through UAS operator-provided evidence that demonstrates that the intended operation is more indicative of another airspace volume and an encounter rate that corresponds to a lower risk classification (ARC); hence, reducing the initial ARC to a residual ARC (as per Table C.2). This requires the agreement of the competent authority before the ARC may be reduced.

The SORA used expertise from subject matter experts to rate the airspace encounter category (AEC) and the variables that influence the encounter rates (i.e. proximity, geometry, and dynamics). The variables are not interdependent, nor do they influence the encounter outcome in the same manner. A small increase in one encounter rate variable can have major effects on the collision risk; conversely, a small increase in another variable could have limited effect on the collision risk. Hence, lowering the aircraft density of an AEC airspace does not equate to a direct and equal lowering of the ARC risk level. There is no direct correlation between an individual AEC variable and the ARC collision risk levels. In summary:

- (a) there are three inter-dependent variables that affect the ARC;
- (b) the contribution of each variable to the total collision risk is not the same; and
- (c) for simplicity, the SORA only allows the manipulation of one of the variables: the proximity, i.e. the aircraft density.

The first step to potentially lowering the ARC is to determine the AEC and the associated density rating using Table C.1. 12 operational/airspace environments were considered for

the SORA air risk classification, and they correspond to the 12 scenarios found in Figure 4 of the SORA main body.

Operational environment, AEC and ARC			
Operations in:	Initial generalised density rating	Corresponding AEC	Initial ARC
Airport/heliport environment			
OPS in an airport/heliport environment in class B, C or D airspace	5	AEC 1	ARC-d
OPS in an airport/heliport environment in class E airspace or in class F or G	3	AEC 6	ARC-c
Operations above 150 m (~500 ft) AGL but below flight level 600			
OPS > 150 m (~500 ft) AGL but < FL 600 in a Mode-S Veil or transponder mandatory zone (TMZ)	5	AEC 2	ARC-d
OPS > 150 m (~500 ft) AGL but < FL 600 in controlled airspace	5	AEC 3	ARC-d
OPS > 150 m (~500 ft) AGL but < FL 600 in uncontrolled airspace over an urban area	3	AEC 4	ARC-c
OPS > 150 m (~500 ft) AGL but < FL 600 in uncontrolled airspace over a rural area	2	AEC 5	ARC-c
Operations below 150 m (~500 ft) AGL			
OPS < 150 m (~500 ft) AGL in a Mode-S Veil or TMZ	3	AEC 7	ARC-c
OPS < 150 m (~500 ft) AGL in controlled airspace	3	AEC 8	ARC-c
OPS < 150 m (~500 ft) AGL in uncontrolled airspace over an urban area	2	AEC 9	ARC-c
OPS < 150 m (~500 ft) AGL in uncontrolled airspace over a rural area	1	AEC 10	ARC-b
Operations above flight level 600			
OPS > FL 600	1	AEC 11	ARC-b
Operations in atypical or segregated airspace			
OPS in atypical/segregated airspace	1	AEC 12	ARC-a

Table C.1 — Initial air risk class assessment

After determining the initial risk using Table C.1, an applicant may choose to reduce that risk using Table C.2. To understand Table C.2, the first column shows the AEC in the environment in which the UAS operator wishes to operate. Column A shows the associated airspace density rating for that AEC rated from 5 to 1, with 5 being very high density, and 1 being very low density.

Column B shows the corresponding initial ARC.

Column C is key to lowering the initial ARC. This column shows the relative density ratings that a UAS operator should demonstrate to the competent authority in order to argue and justify that the actual local air density rating of the operational area is lower than the rating associated with the initial AEC (Column A) in Table C.1. If this can be shown and accepted by the competent authority, then the new lower ARC level as shown in column D may be applicable.

As stated earlier, the UAS operator is responsible for collecting and analysing the airspace density and for demonstrating the effectiveness of their proposal for strategic mitigations by operational restrictions to the competent authority. In summary, the UAS operator should demonstrate that the restrictions imposed on the UAS operation can lower the risk of a collision by showing that the local airspace encounter rate, under the operational restrictions, is lower than the generalised AEC assessed encounter rate provided in Table C.1.

The strategic mitigation reduction case should be modelled after a safety case. The size and complexity of the strategic mitigation reduction depends entirely on what the UAS operator is trying to do, and where/when they want to do it. The strategic mitigation case as a safety case has two advantages. Firstly, it provides the UAS operator with a structured approach to describe and capture the operation, the hazards identified, the risk analysed, and the threat(s) mitigated. Secondly, it provides a safety case structure that a competent authority is familiar with, which, in turn, helps the competent authority to understand the UAS operator's intended operation and their reasoning as to why a reduction in the ARC can be safely justified.

As each authority is different, the SORA recommends the applicant to contact the competent authority and/or ANSP to determine the format and presentation of the strategic mitigation reduction case.

The density rating of manned aircraft, assessed on a scale of 1 to 5, with 1 representing a very low density and 5 representing a very high density.				
Column	A	B	C	D
AEC	Initial generalised density rating for the environment	Initial ARC	If the local density can be demonstrated to be similar to:	New lowered (residual) ARC
AEC 1 or; AEC 2	5	ARC-d	4 or 3 2 or 1 ^{Note 1}	ARC-c ARC-b
AEC 3	4	ARC-d	3 or 2 1 ^{Note 1}	ARC-c ARC-b
AEC 4	3	ARC-c	1 ^{Note 1}	ARC-b
AEC 5	2	ARC-c	1 ^{Note 1}	ARC-b
AEC 6 or; AEC 7 or; AEC 8	3	ARC-c	1 ^{Note 1}	ARC-b
AEC 9	2	ARC-c	1 ^{Note 1}	ARC-b

Note 1: The reference environment for assessing density is AEC 10 (OPS < 400 ft AGL over rural areas).

AEC10 and AEC 11 are not included in this table, as any ARC reduction would result in ARC-a. A UAS operator claiming a reduction to ARC-a should demonstrate that all the requirements that define atypical or segregated airspace have been met.

Table C.2

To fully understand the above, the SORA provides three examples.

Example 1:

A UAS operator intends to operate in an airport/heliport environment, in class C airspace, which corresponds to AEC 1.

The UAS operator enters the initial ARC reduction table at Row AEC 1. Column A shows that the generalised airspace density of this environment is 5. Column B shows the associated initial ARC as ARC-d. Column C indicates that if a UAS operator can demonstrate that the actual, local airspace density corresponds to a generalised density rating of 3 or 4, then the ARC level may be reduced to a residual ARC-c (Column D). If a UAS operator demonstrates that the local airspace density corresponds more to scenarios with a density of 2 or 1, then the ARC level may be lowered to a residual ARC-b (Column D).

Example 2:

A UAS operator intends to operate in an airport/heliport environment, in class G airspace, with a corresponding level of AEC 6.

The UAS operator enters the initial ARC reduction table at Row AEC 6. Column A shows that the generalised airspace density rating that corresponds with this environment is 3. Column B shows the associated initial ARC as ARC-c. Column C indicates that if a UAS operator can demonstrate that the actual, local, airspace density corresponds more to the reference scenario that has a generalised density rating of 1, namely AEC 10, then the residual ARC level may be reduced to ARC-b (Column D).

Example 3:

A UAS operator intends to operate below 150m (~500 ft) AGL, in a class G (uncontrolled) airspace, over an urbanised area, with a corresponding level of AEC 9.

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

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

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

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

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

SORA does not allow the initial ARC to be lowered through strategic mitigation by common structures and rules for all operations in AEC 1, 2, 3, 4, 5, and 11¹. Outside the scope of SORA, a UAS operator may appeal to the competent authority to lower the ARC by strategic mitigation by using common structures. The determination of acceptability falls under the normal airspace rules, regulations and safety requirements for ATM/ANS providers.

Similarly, SORA does not allow for lowering the initial ARC through strategic mitigation by using common structures and rules for all operations in AEC 10².

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

SORA does allow for lowering the initial ARC through strategic mitigation by structures and rules for all operations below 150 m (~500 ft) AGL within VLL airspace (AECs 7, 8, 9 and 10).

To claim an ARC reduction, the UAS operator should show the following:

- (a) the UA is equipped with an electronic cooperative system, and navigation and anti-collision lighting³;
- (b) a procedure has been implemented to verify the presence of other traffic during the UAS flight operation (e.g. checking other aircraft's filed flight plans, NOTAMs⁴, etc.);
- (c) a procedure has been implemented to notify other airspace users of the planned UAS operation (e.g. filing of the UAS flight plan, applying for a NOTAM from the service provider for UAS⁵ operations, etc.);
- (d) permission has been obtained from the airspace owner to operate in that airspace (if applicable);
- (e) compliance with the airspace UAS flight rules, the UAS Regulation, and the policies, etc. applicable to the UAS operational volume and with which all/most aircraft are required to comply (these flight rules, the UAS Regulation, and policies are aimed primarily at UAS operations in VLL airspace);
- (f) a UAS airspace structure (e.g. U-space) exists in VLL airspace to help keep UAS separated from manned aircraft. This structure must be complied with by all UAS in accordance with the EU⁶ or national regulations;

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

² AEC 10: the initial ARC is ARC-b. To lower the ARC in these volumes of airspace (to ARC-a) requires the operational volume to meet one of the requirements of atypical/segregated airspace.

³ Although the SORA takes into account the questionable effects of anti-collision lighting, it also takes into account that the installation of anti-collision lights is often relatively simple and has a net positive effect in preventing collisions.

⁴ Although NOTAMs are used here as an example, the use of NOTAMs may not be acceptable unless they cover all operations in VLL airspace. It is envisioned that a separate system like that of NOTAMs, which specifically addresses the concerns of VLL airspace, will fulfil this requirement.

⁵ Although flight plans and posting NOTAMS are used here as examples, the use of flight plans and NOTAMs may not be acceptable unless they cover all operations in VLL airspace. It is envisioned that a separate system, which specifically addresses the concerns of VLL airspace, will fulfil this requirement.

⁶ The U-space regulation and the relevant adaptation of SERA will apply

- (g) a UAS airspace procedural separation service has been implemented for VLL airspace. The use of this service must be mandatory for all UAS to keep UAS separated from manned aircraft¹ in accordance with the SERA Regulation; and
- (h) all UAS operators can directly communicate with the air traffic controller or flight information services directly or through a U-space service provider in accordance with the SERA Regulation (EU).

C.6.3.1 Demonstration of strategic mitigation by structures and rules

The UAS operator is responsible for collecting and analysing the data required to demonstrate the effectiveness of their strategic mitigations by structures and rules to the competent authority.

C.7 Determination of the residual ARC risk level by the competent authority

As stated before, the UAS operator is responsible for collecting and analysing the data required to demonstrate the effectiveness of all their strategic mitigations to the competent authority.

The competent authority makes the final determination of the airspace residual ARC level.

Caution: As the SORA breaks down collision mitigation into strategic and tactical parts, there can be some overlap between all these mitigations. The UAS operator and the competent authority need to be cognisant and to ensure that mitigations are not counted twice.

Although the static generalised risk (i.e. ARC) is conservative, there may be situations where that conservative assessment may be insufficient. In those situations, the competent authority may raise the ARC to a level that is higher than that advocated by the SORA.

For example, a UAS operator surveys a forest near an airport for beetle infestation, and the airspace was assessed as being ARC-b. The airport is hosting an air show. The competent authority informs the UAS operator that during the week of the air show, the ARC for that local airspace will be ARC-d. The UAS operator can either equip for ARC-d airspace or suspend operations until the air show is over.

¹ This refers to possible future applications of an automated traffic management separation service for unmanned aircraft in a U-space environment. These applications may not exist as such today. A subscription to these services may be required.

Annex D to AMC1 to Article 11

ED Decision 2019/021/R

TACTICAL MITIGATION COLLISION RISK ASSESSMENT

D.1 Introduction-tactical mitigation

The target audience for Annex D is the UAS operator who wishes to apply TMPR, robustness, integrity, and assurance levels for their operation.

Annex D provides the tactical mitigation(s) used to reduce the risk of a mid-air collision. The TMPR is driven by the residual collision risk of the airspace. Some of these tactical mitigations may also provide means of compliance with point SERA.3201 of the SERA Regulation, and the additional requirements of various states.

The air-risk model has been developed to provide a holistic method to assess the risk of an air encounter, and to mitigate the risk that an encounter develops into a mid-air collision. The SORA air-risk model guides the UAS operator, the competent authority, and/or ANSP in determining whether an operation can be conducted in a safe manner. This Annex is not intended to be used as a checklist, nor does it provide answers to all the challenges of DAA. The guidance allows a UAS operator to determine and apply a suitable means of mitigation to reduce the risk of a mid-air collision to an acceptable level. This guidance does not contain prescriptive requirements, but rather objectives to be met at various levels of robustness.

D.2 Principles

The mitigation of the risk that an encounter develops into a mid-air collision is a highly dynamic, variable, and complicated process. To simplify the process, the air-risk model takes a more qualitative approach to arrive at an initial aggregated airspace risk assessment. After an assessment of the initial, unmitigated risk of an encounter, and optional application of strategic mitigations, this Annex assigns a performance requirement on the UAS operation to mitigate the remaining collision hazard (i.e. the residual airspace risk).

D.3 Scope, assumptions and definitions

See Annex C for the scope and assumptions

D.4 Knowledge of terms and definitions

To understand this section, the following SORA definitions need to be understood:

- (a) atypical/segregated vs other airspace;
- (b) AEC (see Annex C);
- (c) initial ARC (see Annex C);
- (d) residual ARC (see Annex C);
- (e) ICAO conflict management (see ICAO Doc 9854, Section 2.7);
- (f) strategic mitigation (see Annex C);
- (g) tactical mitigations and feedback loops; and
- (h) VLOS and BVLOS.

D.5 TMPR assignment

A tactical mitigation is a mitigation applied after take-off, and for the air risk model, it takes the form of a 'mitigating feedback loop'. This feedback loop is dynamic in that it reduces the rate of

collision by modifying the geometry and dynamics of the aircraft in conflict, based on real-time aircraft conflict information.

SORA tactical mitigations are applied to cover the gap between the residual risk of an encounter (the residual ARC) and the airspace safety objectives. The residual risk is the remaining collision risk after all strategic mitigations are applied.

D.5.1 Two classifications of tactical mitigation

There are two classifications of tactical mitigations within the SORA, namely:

- (a) VLOS, whereby a pilot and/or observer uses (use) human vision to detect aircraft and take action to remain well clear from and avoid collisions with other aircraft.
- (b) BVLOS, whereby an alternate means of mitigation to human vision, as in machine or machine assistance¹, is applied to remain well clear from and avoid collisions with other aircraft (e.g. ATC separation services, TCAS, DAA, U-space, etc.).

D.5.2 TMRP using VLOS

Originally the regulations for ‘see and avoid’ and ‘avoid collisions’, defined in point SERA.3201 of the SERA Regulation, assumed that a pilot was on board the aircraft. With UA, this assumption is no longer valid, as the aircraft is piloted remotely.

Under VLOS, the pilot/UAS operator accomplishes ‘see and avoid’ by keeping the UAS within their VLOS. The UAS remains close enough to the remote pilot/observer to allow them to see and avoid another aircraft with human vision unaided by any device other than, perhaps, corrective lenses. VLOS is generally considered an acceptable means of compliance with the ‘remain well clear from’ and ‘avoiding collisions’ requirements of point SERA.3201 of the SERA Regulation.

VLOS generally provides sufficient mitigation for cases where the requirements for tactical mitigations are low, medium, and high. Different states may have other rules and restrictions for VLOS operations (e.g. altitudes, horizontal distances, times for relaying critical flight information, UAS operator/observer training, etc.). In some situations, the competent authority may decide that VLOS does not provide sufficient mitigation for the airspace risk, and may require compliance with additional rules and/or requirements. It is the UAS operators’ responsibility to comply with these rules and requirements.

The UAS operator should produce a documented VLOS de-confliction scheme, explaining the methods that will be applied for detection and the criteria used to avoid incoming traffic. If the remote pilot relies on detection by observers, the use of communication phraseology, procedures, and protocols should be described. Since the VLOS operation may be sufficiently complex, a requirement to document and approve the VLOS strategy is necessary before approval by the competent authority.

The use of VLOS as a mitigation does not exempt the UAS operator from performing the full SORA risk analysis.

D.5.3 TMRP using BVLOS

Since VLOS has operational limitations, there was a concerted effort to find an alternate means of compliance with the human ‘see and avoid’ requirements. This alternate means of mitigation is loosely described as ‘detect and avoid (DAA)’. DAA can be achieved in several ways, e.g. through ground-based DAA systems, air-based DAA systems, or some

¹ For the purposes of this dissection, systems like ATC separation services would be considered to be machine assisted.

combination of the two. DAA may incorporate the use of various sensors, architectures, and even involve many different systems, a human in the loop, on the loop, or no human involvement at all.

TMPR provides tactical mitigations to assist the pilot in detecting and avoiding traffic under BVLOS conditions. The TMPR is the amount of tactical mitigation required to further mitigate the risks that could not be mitigated through strategic mitigation (the residual risk). The amount of residual risk is dependent on the ARC. Hence, the higher the ARC, the greater the residual risk, and the greater the TMPR.

Since the TMPR is the total performance required by all tactical mitigation means, tactical mitigations may be combined. When combining multiple tactical mitigations, it is important to recognise that the mitigation means may interact with each other, depending on the level of interdependency. This may negatively affect the effectiveness of the overall mitigation. Care should be exercised not to underestimate the negative effects of interactions between mitigation systems. Regardless of whether mitigations or systems are dependent or independent, when they act on the same event, unintended consequences may occur.

D.5.3.1 TMPR assignment risk ratio

The SORA TMPR is based on the findings of several studies. These studies provide performance guidance using risk ratios. Table shows the SORA TMPR risk ratio requirements derived from those studies.

Air-Risk Class	TMPR	TMPR system risk ratio objectives
ARC-d	high performance	system risk ratio ≤ 0.1
ARC-c	medium performance	system risk ratio ≤ 0.33
ARC-b	low performance	system risk ratio ≤ 0.66
ARC-a	No performance requirement	No system risk ratio guidance; although the UAS operator/applicant may still need to show some form of mitigation as deemed necessary by the competent authority

Table D.1 — TMPR risk ratio requirements table

Table provides TMPR qualitative criteria as a qualitative means of compliance to help UAS operators translate the risk ratio quantitative values found in Table D.1 into system qualitative functional requirements. Table D.3 provides guidance for the TMPR integrity and assurance objectives for compliance with the objectives of Table C.1.

For the purpose of this assessment, the objectives of Table D.1 take precedence over the guidance provided in Tables D.2 and D.3.

D.5.3.2 TMPR qualitative criterion table

Table D.2, below, shows more qualitative criteria for the different functions and levels of the TMPR. The qualitative criteria are divided into five sub-functions of DAA, namely: detect, decide, command, execute, and the feedback loop. Where reference is made to the detection of a percentage of all aircraft, this should be read as a detection rate of the overall mix of aircraft anticipated to be encountered

in the detection volume, and not limited to the detection of just the subset of aircraft in the mix.

	Function	TMPR Level				
		VLOS	No Requirement (ARC-a)	Low (ARC-b)	Medium (ARC-c)	High (ARC-d)
Tactical mitigation performance requirements (TMPR)	Detect ¹	No Requirement	No Requirement	The expectation is for the applicant's DAA Plan to enable the operator to detect approximately 50 % of all aircraft in the detection volume². This is the performance requirement in the absence of failures and defaults. It is required that the applicant has awareness of most of the traffic operating in the area in which the operator intends to fly, by relying on one or more of the following: • Use of (web-based) real time aircraft tracking services • Use Low Cost ADS-B In /UAT/FLARM³/Pilot Aware³ aircraft trackers • Use of UTM/U-space Dynamic Geofencing⁴ • Monitoring aeronautical radio communications (e.g. use of a scanner)⁵	The expectation is for the applicant's DAA Plan to enable the operator to detect approximately 90 % of all aircraft in the detection volume². To accomplish this, the applicant will have to rely on one or a combination of the following systems or services: • Ground based DAA /RADAR • FLARM^{3/6} • Pilot Aware^{3/6} • ADS-B In/ UAT In Receiver⁶ • ATC Separation Services⁷ • UTM/U-space Surveillance Service⁴ • UTM/U-space Early Conflict Detection and Resolution Service⁴ • Active communication with ATC and other airspace users⁵. The operator provides an assessment of the effectiveness of the detection tools/methods chosen.	A system meeting RTCA SC-228 or EUROCAE WG-105 MOPS/MASPS (or similar) and installed in accordance with applicable requirements.

¹For an in-depth understanding of the derivation, please see Annex G. Detection should be done with adequate precision for the avoidance manoeuvre to be effective.

²The detection volume is the volume of airspace (temporal or spatial measurement) which is required to avoid a collision (and remain well clear if required) with manned aircraft. It can be thought of as the last point at which a manned aircraft must be detected, so that the DAA system can perform all the DAA functions. The detection volume is not tied to the sensor(s) Field of View/Field of Regard. The size of the detection volume depends on the aggravated closing speed of traffic that may reasonably be encountered, the time required by the remote pilot to command the avoidance manoeuvre, the time required by the system to respond and the manoeuvrability and performance of the aircraft. The detection volume is proportionally larger than the alerting threshold.

³FLARM and PilotAware are commercially available (trademarked) products/brands. They are referenced here only as example technologies. The references do not imply an endorsement by the approval authority for the use of these products. Other products offering similar functions may also be used.

⁴These refer to possible future applications of automated traffic management systems for unmanned aircraft in an UTM/U-space environment. These applications may not exist as such today.

⁵If permitted by the authority. May require a Radio-License or Permit.

⁶The selection of systems to aid in electronic detection of traffic should be made considering the average equipment of the majority of aircraft operating in the area. For example: in areas where many gliders are known to operate, the use of FLARM or similar systems should be considered whereas for operations in the vicinity of large commercially operated aircraft, ADS-B IN is probably more appropriate. These refer to possible future applications of automated traffic management systems for unmanned aircraft in an UTM/U-space environment. These applications may not exist as such today. A subscription to these services may be required.

⁷The selection of systems to aid in electronic detection of traffic should be made considering the average equipment of the majority of aircraft operating in the area.

	Function	TMPR Level				
		VLOS	No Requirement (ARC-a)	Low (ARC-b)	Medium (ARC-c)	High (ARC-d)
Tactical mitigation performance requirements (TMPR)	Decide	No Requirement	No Requirement	The UAS operator should have a documented de-confliction scheme, in which the UAS operator explains which tools or methods will be used for detection and what the criteria are that will be applied for the decision to avoid incoming traffic. In case the remote pilot relies on detection by someone else, the use of phraseology will have to be described as well. Examples: • The operator will initiate a rapid descend if traffic is crossing an alert boundary and operating at less than 1000ft. • The observer monitoring traffic uses the phrase: 'DESCEND!', 'DESCEND!', 'DESCEND!'.	All requirements of ARC-b and in addition: 1. The operator provides an assessment of the human/machine interface factors that may affect the remote pilot's ability to make a timely and appropriate decision. 2. The UAS operator provides an assessment of the effectiveness of the tools and methods utilised for the timely detection and avoidance of traffic. In this context timely is defined as enabling the remote pilot to decide within 5 seconds after the indication of incoming traffic is provided. The UAS operator provides an assessment of the failure rate or availability of any tool or service the UAS operator intends to use.	A system meeting RTCA SC-228 or EUROCAE WG-105 MOPS/MASPS (or similar) and installed in accordance with applicable requirements.

	Function	TMPR Level				
		VLOS	No Requirement (ARC-a)	Low (ARC-b)	Medium (ARC-c)	High (ARC-d)
Tactical mitigation performance requirements (TMPR)	Command	No Requirement	No Requirement	The latency of the whole command (C2) link, i.e. the time between the moment that the remote pilot gives the command and the airplane executes the command should not exceed 5 seconds.	The latency of the whole command (C2) link, i.e. the time between the moment that the remote pilot gives the command and the airplane executes the command should not exceed 3 seconds.	A system meeting RTCA SC-228 or EUROCAE WG-105 MOPS/MASPS (or similar) and installed in accordance with applicable requirements.

	Function	TMPR Level				
		VLOS	No Requirement (ARC-a)	Low (ARC-b)	Medium (ARC-c)	High (ARC-d)
Tactical mitigation performance requirements (TMPR)	Execute	No Requirement	No Requirement	UAS descending to an altitude not higher than the nearest trees, buildings or infrastructure or ≤ 60 feet AGL is considered sufficient. The aircraft should be able to descend from its operating altitude to the 'safe altitude' in less than a minute.	Avoidance may rely on vertical and horizontal avoidance manoeuvring and is defined in standard procedures. Where horizontal manoeuvring is applied, the aircraft shall be demonstrated to have adequate performance, such as airspeed, acceleration rates, climb/descend rates and turn rates. The following are suggested minimum performance criteria: ¹⁰ • Airspeed: ≥ 50 knots • Rate of climb/descend: ≥ 500 ft/min • Turn rate: ≥ 3 degrees per second	A system meeting RTCA SC-228 or EUROCAE WG-105 MOPS/MASPS (or similar) and installed in accordance with applicable requirements.

¹⁰ Low End Performance Representative (LEPR) performance requirements for RTCA SC-228 Study 5

	Function	TMPR Level				
		VLOS	No Requirement (ARC-a)	Low (ARC-b)	Medium (ARC-c)	High (ARC-d)
Tactical mitigation performance requirements (TMPR)	Feedback Loop	No Requirement	No Requirement	Where electronic means assist the remote pilot in detecting traffic, the information is provided with a latency and update rate for intruder data (e.g. position, speed, altitude, track) that support the decision criteria. For an assumed 3 NM threshold, a 5 second update rate and a latency of 10 seconds is considered adequate (see example below).	The information is provided to the remote pilot with a latency and update rate that support the decision criteria. The applicant provides an assessment of the aggravated closure rates considering traffic that could reasonably be expected to operate in the area, traffic information update rate and latency, C2 Link latency, aircraft manoeuvrability and performance and sets the detection thresholds accordingly. The following are suggested minimum criteria: • Intruder and ownship vector data update rates: ≤ 3 seconds.	A system meeting RTCA SC-228 or EUROCAE WG-105 MOPS/MASPS (or similar) and installed in accordance with applicable airworthiness requirements.

Table D.2 — TMPR qualitative criteria table

D.5.3.3 Effects of aircraft equipment on tactical system performance

The performance of a tactical mitigation is affected by the equipment of both the UAS and threat aircraft, on an encounter-by-encounter basis. A tactical mitigation mitigates the encounter risk by using a set of sub-functions of the DAA routine,

namely see/detect, decide, command, execute, and feedback loop. Equipment that aids these sub-functions increases the overall performance of the tactical mitigation system.

The following example illustrates how the equipment of both the UAS and threat aircraft affects the overall tactical performance. Given a threat aircraft equipped with a transponder, it is easier for other aircraft to detect and track the threat aircraft. In this case, the UAS can be equipped with a system that is able to detect and track transponders. However, a UAS that mitigates the risk by locating the threat aircraft by detecting their transponder (e.g. through ACAS-II V. 7.1) cannot use the same approach to mitigate the risks posed by an aircraft without a transponder.

Tactical mitigation equipment is not homogeneous within the airspace. Different classes of airspace have different mixes of equipment. General aviation aircraft tend to be less well-equipped than commercial aircraft. There will be differences in the mix of general aviation/commercial aircraft from one location/airspace to another. Based on the aircraft equipment, a specific tactical system (e.g. FLARM, ACAS, etc.) could mitigate the risk of a collision in some classes of airspace and not in others.

Therefore, the UAS operator needs to understand the effectiveness of their tactical mitigation systems within the context of the airspace in which they intend to operate, and select systems used for tactical mitigation accordingly. A TCAS II 7.1/ACAS-II equipped UAS will not mitigate all the encounter risks in an area where sailplanes equipped with FLARM are known to operate.

D.5.4. TMRP robustness (integrity and assurance) assignment

Table D.3, below, lists the recommended requirements to comply with the TMRP integrity and assurance assignment.

		TMPR: N/A (ARC-a)	TMPR: Low (ARC-b)	TMPR: Medium (ARC-c)	TMPR: High (ARC-d)
Level of integrity	Criteria	Allowable loss of function and performance of the Tactical Mitigation System: < 1 per 100 Flight Hours (1E-2 Loss/FH)	Allowable loss of function and performance of the Tactical Mitigation System: < 1 per 100 Flight Hours (1E-2 Loss/FH)	Allowable loss of function and performance of the Tactical Mitigation System: < 1 per 1 000 Flight Hours (1E-3 Loss/FH)	Allowable loss of function and performance of the Tactical Mitigation System: < 1 per 100 000 Flight Hours (1E-5 Loss/FH)
	Comments / Notes	The requirement is considered to be met by commercially available products. No quantitative analysis is required.	The requirement is considered to be met by commercially available products. No quantitative analysis is required.	This rate is commensurate with a probable failure condition. These failure conditions are anticipated to occur one or more times during the entire operational life of each aircraft.	A quantitative analysis is required.
		TMPR: N/A (ARC-a)	TMPR: Low (ARC-b)	TMPR: Medium (ARC-c)	TMPR: High (ARC-d)
Level of assurance	Criteria	N/A	The operator declares that the tactical mitigation system and procedures will mitigate the risk of collisions with manned aircraft to an acceptable level.	The operator provides evidence that the tactical mitigation system will mitigate the risk of collisions with manned aircraft to an acceptable level.	The evidence that the tactical mitigation system will mitigate the risk of collisions with manned aircraft to an acceptable level is verified by a competent third party.
	Comments / Notes	N/A	N/A	N/A	N/A

Table D.3 — TMPR integrity and assurance objectives

D.6 Maintenance and continued airworthiness

The DAA maintenance and continued airworthiness requirements are addressed in the SAIL requirements; please refer to Annex E.

Annex E to AMC1 to Article 11

ED Decision 2023/012/R

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

E.1 How to use SORA Annex E

The following Table E.1 provides the basic principles to consider when using SORA Annex E.

	Principle description	Additional information
#1	Annex E provides assessment criteria for the integrity (i.e. safety gain) and assurance (i.e. method of proof) of OSOs proposed by an applicant.	The identification of OSOs for a given operation is the responsibility of the applicant.
#2	Annex E does not cover the Lol of the competent authority. Lol is based on the competent authority's assessment of the applicant's ability to perform the given operation.	
#3	To achieve a given level of integrity/assurance, when more than one criterion exists for that level of integrity/assurance, all applicable criteria need to be met.	
#4	'Optional' cases defined in SORA main body Table 6 do not need to be defined in terms of integrity and assurance levels in Annex E.	All robustness levels are acceptable for OSOs for which an 'optional' level of robustness is defined in Table 6 'Recommended OSOs' of the SORA main body.
#5	When the criteria to assess the level of integrity or assurance of an OSO rely on 'standards' that are not yet available, the OSO needs to be developed in a manner acceptable to the competent authority.	
#6	Annex E intentionally uses non-prescriptive terms (e.g. suitable, reasonably practicable) to provide flexibility to both the applicant and the competent authorities. This does not constrain the applicant in proposing mitigations, nor the competent authority in evaluating what is needed on a case-by-case basis.	
#7	This annex in its entirety also applies to single-person organisations.	

Table E.1 – Basic principles to consider when using SORA Annex E

E.2 OSOs related to technical issues with the UAS

OSO #01 — Ensure that the UAS operator is competent and/or proven

TECHNICAL ISSUE WITH THE UAS		Level of integrity		
		Low	Medium	High
OSO #01 Ensure that the UAS operator is competent and/or proven	Criteria	The applicant is knowledgeable of the UAS being used and as a minimum has the following relevant operational procedures: checklists, maintenance, training, responsibilities, and associated duties.	Same as low. In addition, the applicant has an organisation appropriate ¹ for the intended operation. Also, the applicant has a method to identify, assess, and mitigate the risks associated with flight operations. These should be consistent with the nature and extent of the operations specified.	Same as medium.
	Comments	N/A	¹ For the purpose of this assessment, 'appropriate' should be interpreted as commensurate with/proportionate to the size of the organisation and the complexity of the operation.	N/A

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

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

TECHNICAL ISSUE WITH THE UAS		Level of integrity		
		Low	Medium	High
OSO #02 UAS designed and produced by a competent and/or proven entity	Criteria for design	As a minimum, design documentation covers: (a) the specification of the materials; and (b) the suitability and durability of the materials used.	Same as low. In addition, design documentation also covers: (a) the configuration control; and (b) identification and traceability.	The design organisation complies with Subpart J of Annex I (Part 21) to Regulation (EU) No 748/2012.
	Criteria for production	As a minimum, production procedures cover the processes necessary to allow for repeatability in manufacturing, and conformity within acceptable tolerances.	Same as low. In addition, production procedures also cover: (a) the configuration control; (b) the verification of incoming products, parts, materials, and equipment; (c) identification and traceability; (d) in-process and final inspections & testing; (e) the control and calibration of tools; (f) handling and storage; and (g) the control of non-conforming items.	The production organisation complies with the organisational requirements that are defined in Subpart F or G of Annex I (Part 21) to Regulation (EU) No 748/2012.
	Comments	N/A	N/A	N/A

TECHNICAL ISSUE WITH THE UAS		Level of assurance		
		Low	Medium	High
OSO #02 UAS designed and produced by a competent and/or proven entity	Criteria for design	The specifications, suitability and durability of the materials are declared against a standard recognised by the competent authority and/or in accordance with means of compliance acceptable to the competent authority.	Same as low. In addition, evidence is available that the UAS has been designed in accordance with design procedures. The competent authority should request the applicant to use a UAS for which EASA	Same as medium. In addition, the competent authority should request the applicant to operate a UAS designed by an organisation approved by EASA according to Subpart J of Annex I

			has verified the claimed integrity through a DVR.	(Part 21) to Regulation (EU) No 748/2012.
	Criteria for production	The declared production procedures are developed to a standard that is considered adequate by the competent authority that issues the operational authorisation and/or in accordance with a means of compliance acceptable to that authority.	Same as low. In addition, evidence is available that the UAS has been produced in conformance with its design.	Same as medium. In addition, the competent authority of the MS or an entity that is designated by the competent authority validates compliance with the production organisational requirements that are defined in Subpart F or G of Annex I (Part 21) to Regulation (EU) No 748/2012.
	Comments	N/A	N/A	N/A

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

TECHNICAL ISSUE WITH THE UAS		Level of integrity		
		Low	Medium	High
OSO #03 UAS maintained by a competent and/or proven entity (e.g. industry standards)	Criteria	(a) The UAS <u>maintenance instructions</u> are defined, and, when applicable, cover the UAS designer's instructions and requirements. (b) The maintenance staff is competent and has received an authorisation to carry out UAS maintenance. (c) The maintenance staff use the UAS maintenance instructions while performing maintenance.	Same as low. In addition: (a) Scheduled maintenance of each UAS is organised and in accordance with a <u>maintenance programme</u> . (b) Upon completion, the maintenance log system is used to record all the maintenance conducted on the UAS, including releases. A maintenance release can only be accomplished by a staff member who has received a maintenance release authorisation for that particular UAS model/family.	Same as medium. In addition, the maintenance staff work in accordance with a <u>maintenance procedure manual</u> that provides information and procedures relevant to the maintenance facility, records, maintenance instructions, release, tools, material, components, defect deferral, etc.
	Comments	N/A	N/A	N/A

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

OSO #04 — UAS developed to authority recognised design standards

TECHNICAL ISSUE WITH THE UAS		Level of integrity		
		Low	Medium	High
OSO #04 UAS developed to authority recognised design standards	Criteria	The UAS is designed to standards considered adequate by the competent authority and/or in accordance with a means of compliance acceptable to that authority. The standards and/or the means of compliance should be applicable to a <u>low</u> level of integrity and the intended operation.	The UAS is designed to standards considered adequate by the competent authority and/or in accordance with a means of compliance acceptable to that authority. The standards and/or the means of compliance should be applicable to a <u>medium</u> level of integrity and the intended operation.	The UAS is designed to standards considered adequate by the competent authority and/or in accordance with a means of compliance acceptable to that authority. The standards and/or the means of compliance should be applicable to a <u>high</u> level of integrity and the intended operation.
	Comments	<i>In case of experimental flights that investigate new technical solutions, the competent authority may accept that recognised standards are not met.</i>		

TECHNICAL ISSUE WITH THE UAS		Level of assurance		
		Low	Medium	High
OSO #04 UAS developed to authority recognised design standards	Criteria	The competent authority should request the applicant to use a UAS for which EASA has verified the claimed integrity through a DVR.	The competent authority should request the applicant to use a UAS for which EASA has issued a type certificate or restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012	The competent authority should request the applicant to use a UAS for which EASA has issued a type certificate or restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012
	Comments	N/A	N/A	N/A

OSO #05 — UAS is designed considering system safety and reliability

This OSO complements:

- (a) the safety requirements for containment defined in the main body; and
- (b) OSO #10 and OSO #12, which only address the risk of a fatality while operating over populated areas or assemblies of people.

TECHNICAL ISSUE WITH THE UAS		Level of integrity		
		Low	Medium	High
OSO #05 UAS is designed considering system safety and reliability	Criteria	The equipment, systems, and installations are designed to minimise hazards ¹ in the event of a probable ² malfunction or failure of the UAS.	Same as low. In addition, the strategy for detection, alerting and management of any malfunction, failure or combination thereof, which would lead to a hazard, is available.	Same as medium. In addition: (a) Major failure conditions are not more frequent than remote ³ ; (b) Hazardous failure conditions are not more frequent than extremely remote ³ ; (c) Catastrophic failure conditions are not more frequent than extremely improbable ³ ; and (d) SW and AEH whose development error(s) may cause or contribute to hazardous or catastrophic failure conditions are developed to an industry standard or a methodology considered adequate by EASA and/or in accordance with means of compliance acceptable to EASA ⁴ .
	Comments	¹ For the purpose of this assessment, the term 'hazard' should be interpreted as a failure condition that relates to major, hazardous, or catastrophic consequences. ² For the purpose of this assessment, the term 'probable' should be interpreted in a qualitative way as 'anticipated to occur one or more times during the entire system/operational life of a UAS'.	N/A	³ Safety objectives may be derived from JARUS AMC RPAS.1309 Issue 2 Table 3 depending on the kinetic energy assessment made in accordance with Section 6 of EASA policy E.Y013-01. ⁴ Development assurance levels (DALs) for SW/AEH may be derived from JARUS AMC RPAS.1309 Issue 2 Table 3 depending on the kinetic energy assessment made in accordance with Section 6 of EASA policy E.Y013-01.

TECHNICAL ISSUE WITH THE UAS		Level of assurance		
		Low	Medium	High
OSO #05 UAS is designed considering system safety and reliability	Criteria	A functional hazard assessment ¹ and a design and installation appraisal that show that hazards are minimised, are available.	Same as low. In addition: (a) Safety analyses are conducted in line with standards considered adequate by the competent authority and/or in accordance with a means of compliance acceptable to that authority. (b) A strategy for the detection of single failures of concern includes pre-flight checks.	The competent authority should request the applicant to use a UAS for which EASA has issued a type certificate or restricted type certificate in accordance with Annex I (Part

TECHNICAL ISSUE WITH THE UAS		Level of assurance		
		Low	Medium	High
			The competent authority should request the applicant to use a UAS for which EASA has validated the claimed integrity through a DVR.	21) to Regulation (EU) No 748/2012.
	Comments	¹ The severity of failure conditions (no safety effect, minor, major, hazardous and catastrophic) should be determined according to the definitions provided in JARUS AMC RPAS.1309 Issue 2.	N/A	N/A

OSO #06 — C3 link characteristics (e.g. performance, spectrum use) are appropriate for the operation

(a) For the purpose of the SORA and this specific OSO, the term ‘C3 link’ encompasses:

- (1) the C2 link; and
- (2) any communication link required for the safety of the flight.

(b) To correctly assess the integrity of this OSO, the applicant should identify the following:

- (1) The performance requirements for the C3 links necessary for the intended operation.
- (2) All the C3 links, together with their actual performance and RF spectrum usage.

Note: The specification of the performance and RF spectrum for a C2 Link is typically documented by the UAS designer in the UAS manual.

Note: The main parameters associated with the performance of a C2 link (RLP) and the performance parameters for other communication links (e.g. RCP for communication with ATC) include, but are not limited to, the following:

- (i) the transaction expiration time;
- (ii) the availability;
- (iii) the continuity; and
- (iv) the integrity.

Refer to the ICAO references for definitions.

- (3) The RF spectrum usage requirements for the intended operation (including the need for authorisation if required).

Note: Usually, countries publish the allocation of RF spectrum bands applicable in their territories. This allocation stems mostly from the International Communication Union (ITU) Radio Regulations. However, the applicant should check the local requirements and request authorisation when needed since there may be national differences and specific allocations (e.g. national sub-divisions of ITU allocations). Some aeronautical bands (e.g. AM(R)S, AMS(R)S 5030-5091MHz) were allocated for potential use in UAS operations under the ICAO scope for UAS operations classified as cat. C ('certified'), but their use may be authorised for operations under the 'specific' category. It is expected that the use of other licensed bands (e.g. those allocated to mobile networks) may also be authorised under the 'specific' category. Some un-licensed bands (e.g. industrial, scientific and medical (ISM) or short-range devices (SRDs)) may also be acceptable under the 'specific' category; for instance, for operations with lower integrity requirements.

- (4) Environmental conditions that might affect the performance of C3 links.

TECHNICAL ISSUE WITH THE UAS		Level of integrity		
		Low	Medium	High
OSO #06 C3 link characteristics (e.g. performance, spectrum use) are appropriate for the operation	Criteria	(a) The applicant determines that the performance, RF spectrum usage ¹ and environmental conditions for C3 links are adequate to safely conduct the intended operation. (b) The remote pilot has the means to continuously monitor the C3 performance and ensures that the performance continues to meet the operational requirements ² .	Same as low ³ .	Same as low. In addition, the use of licensed ⁴ frequency bands for C2 Links is required.
	Comments	¹ For a low level of integrity, unlicensed frequency bands might be acceptable under certain conditions, e.g.: (a) the applicant demonstrates compliance with other RF spectrum usage requirements (e.g. Directive 2014/53/EU), by showing that the UAS equipment is compliant with these requirements; and (b) the use of mechanisms to protect against interference (e.g. FHSS, frequency de-confliction by procedure).	³ Depending on the operation, the use of licensed frequency bands might be necessary. In some cases, the use of non-aeronautical bands (e.g. licensed bands for cellular network) may be acceptable.	⁴ This ensures a minimum level of performance and is not limited to aeronautical licensed frequency bands (e.g. licensed bands for cellular network). Nevertheless, some operations may require the use of bands allocated to the aeronautical mobile service for the use of C2 Link (e.g. 5030 – 5091 MHz). In any case, the use of licensed frequency bands needs authorisation.

TECHNICAL ISSUE WITH THE UAS		Level of integrity		
		Low	Medium	High
		² The remote pilot has continual and timely access to the relevant C3 information that could affect the safety of flight. For operations requesting only 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 strength becomes too low.		

TECHNICAL ISSUE WITH THE UAS		Level of assurance		
		Low	Medium	High
OSO #06 C3 link characteristics (e.g. performance, spectrum use) are appropriate for the operation	Criteria	The applicant declares that the required level of integrity has been achieved.	The competent authority should request the applicant to use a UAS for which EASA has verified the claimed integrity through a DVR.	The competent authority should request the applicant to use a UAS for which EASA has issued a type certificate or restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012.
	Comments	N/A	N/A	N/A

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

The intent of this OSO is to ensure that the UAS used for the operation conforms to the UAS data used to support the approval/authorisation of the operation.

TECHNICAL ISSUE WITH THE UAS		Level of integrity		
		Low	Medium	High
OSO #07 Inspection of the UAS (product inspection) to ensure consistency with the ConOps	Criteria	The remote crew ensures that the UAS is in a condition for safe operation and conforms to the approved ConOps. ¹		
	Comments	¹ The distinction between a low, a medium and a high level of robustness for this criterion is achieved through the level of assurance (see the table below).		

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

E.3 OSOs related to operational procedures

OPERATIONAL PROCEDURES		Level of integrity		
		Low	Medium	High
OSO #08, OSO #11, OSO #14 and OSO #21	Criterion #1 (Procedure definition)	(a) Operational procedures ¹ appropriate for the proposed operation are defined and, as a minimum, cover the following elements: (1) Flight planning; (2) Pre- and post-flight inspections; (3) Procedures to evaluate the environmental conditions before and during the mission (i.e. real-time evaluation); (4) Procedures to cope with unexpected adverse operating conditions (e.g. when ice is encountered during an operation not approved for icing conditions); (5) Normal procedures; (6) Contingency procedures (to cope with abnormal situations); (7) Emergency procedures (to cope with emergency situations); (8) Occurrence-reporting procedures; and (b) The limitations of the external systems supporting the UAS operation ² are defined in an OM.		
	Comments	¹ Operational procedures cover the deterioration of the UAS itself and any external system supporting the UAS operation. To properly address the deterioration of external systems required for the operation, it is recommended to:		

OPERATIONAL PROCEDURES		Level of integrity		
		Low	Medium	High
		(a) identify these ‘external systems’; (b) identify the modes of deterioration of the ‘external systems’ (e.g. complete loss of GNSS, GDOP/PDOP, latency issues, etc.) which would lead to a loss of control of the operation; (c) describe the means to detect these modes of deterioration of the external systems ; and (d) describe the procedure(s) used when deterioration is detected (e.g. activation of the emergency recovery capability, switch to manual control, etc.). ² In the scope of this assessment, external systems supporting the UAS operation are defined as systems that are not already part of the UAS but are used to: (a) launch/take off the UA; (b) make pre-flight checks; or (c) keep the UA within its operational volume (e.g. GNSS, satellite systems, air traffic management, U-space). External systems activated/used after a loss of control of the operation are excluded from this definition.		
	Criterion #2 (Procedure complexity)	Operational procedures are complex and may potentially jeopardise the crew’s ability to respond by increasing the remote crew’s workload and/or their interaction with other entities (e.g. ATM, etc.).	Contingency/emergency procedures require manual control by the remote pilot ² when the UAS is usually automatically controlled.	Operational procedures are simple.
	Comments	N/A	² It should be considered that not all UAS have a mode where the pilot could directly control the surfaces; moreover, it may require significant skill not to make things worse.	N/A
	Criterion #3 (Consideration of Potential Human Error)	At a minimum, operational procedures provide: (a) a clear distribution and assignment of tasks, and (b) an internal checklist to ensure staff are adequately performing their assigned tasks.	Operational procedures take human error into consideration.	Same as medium. In addition, the remote crew ³ receives crew resource management (CRM) ⁴ training.
	Comments	N/A	N/A	³ In the context of SORA, the term ‘remote crew’ refers to any person involved in the mission. ⁴ CRM training focuses on the effective use of all the remote crew to ensure safe and efficient

OPERATIONAL PROCEDURES		Level of integrity		
		Low	Medium	High
				operation, reducing error, avoiding stress and increasing efficiency.

OPERATIONAL PROCEDURES		Level of assurance		
		Low	Medium	High
OSO #08, OSO #11, OSO #14 and OSO #21	Criteria	(a) Operational procedures do not require validation against either a standard or a means of compliance that is considered adequate by the competent authority of the MS. (b) The adequacy of the operational procedures is declared, except for emergency procedures, which are tested.	(a) Normal, contingency, and emergency procedures are documented and part of the operations manual (OM). (b) Operational procedures are validated against standards considered adequate by the competent authority of the MS and/or in accordance with the means of compliance acceptable to that authority¹. (c) The adequacy of the contingency and emergency procedures is proven through: (1) dedicated flight tests; or (2) simulation, provided that the representativeness of the simulation means is proven valid for the intended purpose with positive results; or (3) any other means acceptable to the competent authority.	Same as medium. In addition: (a) Flight tests performed to validate the procedures and checklists cover the complete flight envelope or are proven to be conservative. (b) The procedures, checklists, flight tests and simulations are validated by the competent authority of the MS or by an entity that is designated by the competent authority.
	Comments	N/A	¹ AMC2 UAS.SPEC.030(3)(e) (Operational procedures for medium and high levels of robustness) is considered an acceptable means of compliance.	

E.4 OSOs related to remote crew training

- (a) The applicant needs to propose competency-based, theoretical and practical training that:
 - (1) is appropriate for the operation to be approved; and
 - (2) includes proficiency requirements and recurrent training.
- (b) The entire remote crew (i.e. any person involved in the operation) should undergo competency-based, theoretical and practical training specific to their duties (e.g. pre-flight inspection, ground equipment handling, evaluation of the meteorological conditions, etc.).

REMOTE CREW COMPETENCIES		Level of integrity		
		Low	Medium	High
OSO #09, OSO #15 and OSO #22	Criteria	The competency-based, theoretical and practical training is adequate for the operation ¹ and ensures knowledge of: (a) the UAS Regulation; (b) airspace operating principles; (c) airmanship and aviation safety; (d) human performance limitations; (e) meteorology; (f) navigation/charts; (g) the UAS; and (h) operating procedures.		
	Comments	¹ The distinction between a low, a medium and a high level of robustness for this criterion is achieved through the level of assurance (see table below).		

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

E.5 OSOs related to safe design

- (a) The objectives of OSO#10 and OSO#12 are to complement the technical containment safety requirements by addressing the risk of a fatality while operating over populated areas or assemblies of people.
- (b) In the scope of this assessment, external systems supporting UAS operations are defined as systems that are not already part of the UAS but are used to:
 - (1) launch/take off the UA;

- (2) make pre-flight checks; or
- (3) keep the UA within its operational volume (e.g. GNSS, satellite systems, air traffic management, U-space).

External systems activated/used after a loss of control of the operation are excluded from this definition.

		LEVEL of INTEGRITY		
		Low	Medium	High
OSO #10 & OSO #12	Criteria	When operating over populated areas or assemblies of people, it can be reasonably expected that a fatality will not occur from any <u>probable</u> ¹ failure ² of the UAS or any external system supporting the operation.	When operating over populated areas or assemblies of people, it can be reasonably expected that a fatality will not occur from any <u>single failure</u> ³ of the UAS or any external system supporting the operation. SW and AEH whose development error(s) could directly lead to a failure affecting the operation in such a way that it can be reasonably expected that a fatality will occur, are developed to a standard considered adequate by the competent authority and/or in accordance with means of compliance acceptable to that authority.	Same as medium
	Comments	¹ For the purpose of this assessment, the term 'probable' should be interpreted in a qualitative way as, 'anticipated to occur one or more times during the entire system/operational life of a UAS'. ² Some structural or mechanical failures may be excluded from the criterion if it can be shown that these mechanical parts were designed according to aviation industry best practices.	³ Some structural or mechanical failures may be excluded from the no-single failure criterion if it can be shown that these mechanical parts were designed to a standard considered adequate by the competent authority and/or in accordance with a means of compliance acceptable to that authority	

		LEVEL of ASSURANCE		
		Low	Medium	High
OSO #10 & OSO #12	Criteria	A design and installation appraisal is available. In particular, this appraisal shows that:	Same as low. In addition, the level of integrity claimed is substantiated by analysis and/or test data with supporting evidence.	The competent authority should request the applicant to use a UAS for which EASA has issued a type certificate or restricted type

		LEVEL of ASSURANCE		
		Low	Medium	High
		(a) the design and installation features (independence, separation and redundancy) satisfy the low integrity criterion; and (b) particular risks relevant to the ConOps (e.g. hail, ice, snow, electromagnetic interference, etc.) do not violate the independence claims, if any.	If the operation is classified as SAIL IV, the competent authority should request the applicant to use a UAS for which EASA has verified the claimed integrity through a DVR.	certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012.
	Comments	N/A	N/A	N/A

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

For the purpose of SORA and this specific OSO, the term ‘external services supporting UAS operations’ encompasses any service providers necessary for the safety of the flight, such as communication service providers (CSPs) and U-space service providers¹.

¹ External service should be understood as any service that is provided to the UAS operator, which is necessary to ensure the safety of a UAS operation and is provided by a service provider other than the UAS operator.
Examples of external services are:

- provision of geographical zones data and geographical limitations (including orography);
- collection and transfer of occurrence data;
- training and assessment of remote pilots;
- communication services that support the C2 link and any other safety-related communication;
- services that support navigation, e.g. GNSS services (compliance with requirement UAS.STS-01.030(6) could be ensured by referring to the conditions of use of such services in the corresponding Service Definition Document (SDD) or an equivalent one if available.);
- provision of services related to flight planning and management, including related safety assessments; and
- U-space services, which are defined in the corresponding regulation(s) and may include one or more of the above-mentioned services.

DETERIORATION OF EXTERNAL SYSTEMS SUPPORTING UAS OPERATIONS BEYOND THE CONTROL OF THE UAS		Level of integrity		
		Low	Medium	High
OSO #13 External services supporting UAS operations are adequate for the operation	Criteria	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. If the externally provided service requires communication between the UAS operator and the service provider, the applicant ensures there is effective communication to support the service provision. Roles and responsibilities between the applicant and the external service provider are defined.		
	Comments	N/A	N/A	<i>Requirements for contracting services with the service provider may be derived from ICAO Standards and Recommended Practices (SARPs) that are currently under development.</i>

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

E.7 OSOs related to human error

OSO #16 — Multi-crew coordination

This OSO applies only to those personnel directly involved in the flight operation.

HUMAN ERROR		Level of integrity		
		Low	Medium	High
OSO #16 Multi crew coordination	Criterion #1 (Procedures)	Procedure(s) to ensure coordination between the crew members and robust and effective communication channels is (are) available and at a minimum cover: (a) assignment of tasks to the crew, and (b) establishment of step-by-step communications. ¹		
	Comments	¹ The distinction between a low, a medium and a high level of robustness for this criterion is achieved through the level of assurance (see the table below).		
	Criterion #2 (Training)	Remote crew training covers multi-crew coordination	Same as low. In addition, the remote crew ² receives CRM ³ training.	Same as medium.
	Comments	N/A	² In the context of the SORA, the term 'remote crew' refers to any person involved in the mission. ³ CRM training focuses on the effective use of all the remote crew to assure a safe and efficient operation, reducing error, avoiding stress and increasing efficiency.	N/A
	Criterion #3 (Communication devices)	N/A	Communication devices comply with standards considered adequate by the competent authority and/or in accordance with a means of compliance acceptable to that authority.	Communication devices are redundant ⁴ and comply with standards considered adequate by the competent authority and/or in accordance with a means of compliance acceptable to that authority.
	Comments	N/A	N/A	⁴ This implies the provision of an extra device to cope with the failure of the first device.

HUMAN ERROR		LEVEL of ASSURANCE		
		Low	Medium	High
OSO #16 Multi crew coordination	Criterion #1 (Procedures)	(a) Procedures are not validated against either a standard or a means of compliance considered adequate by the competent authority of the MS. (b) The adequacy of the procedures and checklists is declared.	(a) Procedures are validated against standards considered adequate by the competent authority of the MS and/or in accordance with the means of compliance acceptable to that authority ¹ . (b) The adequacy of the procedures is proven through: (1) dedicated flight tests; or (2) simulation, provided that the representativeness of the simulation means is proven valid for the intended purpose with positive results; or (3) any other means acceptable to the competent authority.	Same as medium. In addition: (a) flight tests performed to validate the procedures cover the complete flight envelope or are proven to be conservative; and (b) the procedures, flight tests and simulations are validated by the competent authority of the MS or an entity designated by the competent authority.
	Comments	N/A	¹ AMC2 UAS.SPEC.030(3)(e) (Operational procedures for medium and high levels of robustness) is considered an acceptable means of compliance.	N/A
	Criterion #2 (Training)	Training is self-declared (with evidence available).	(a) Training syllabus is available. (b) The UAS operator provides competency-based, theoretical and practical training.	The competent authority of the MS or an entity that is designated by the competent authority: (a) validates the training syllabus; and (b) verifies the remote crew competencies.
	Comments	N/A	N/A	N/A
	Criterion #3 (Communication devices)	N/A	The applicant has supporting evidence that the required level of integrity is achieved. This is typically done by testing, analysis, simulation ¹ , inspection, design review or through operational experience.	The competent authority should request the applicant to operate a UAS designed by an organisation approved by EASA according to Subpart J of Annex I (Part 21) to Regulation (EU) No 748/2012.
	Comments	N/A	¹ When simulation is performed, the validity of the targeted environment that is used in the simulation needs to be justified.	N/A

OSO #17 — Remote crew is fit to operate

- (a) For the purpose of this assessment, the expression ‘fit to operate’ should be interpreted as physically and mentally fit to perform their duties and safely discharge their responsibilities.
- (b) Fatigue and stress are contributory factors to human error. Therefore, to ensure that vigilance is maintained at a satisfactory level of safety, consideration may be given to the following:
 - (1) remote crew duty times;
 - (2) regular breaks;
 - (3) rest periods; and
 - (4) handover/takeover procedures.

HUMAN ERROR		Level of integrity		
		Low	Medium	High
OSO #17 Remote crew is fit to operate	Criteria	The applicant has a policy defining how the remote crew can declare themselves fit to operate before conducting any operation.	Same as low. In addition: — Duty, flight duty and resting times for the remote crew are defined by the applicant and adequate for the operation. — The UAS operator defines requirements appropriate for the remote crew to operate the UAS.	Same as Medium. In addition: — The remote crew is medically fit, — A fatigue risk management system (FRMS) is in place to manage any escalation in duty/flight duty times.
	Comments	N/A	N/A	N/A

HUMAN ERROR		LEVEL of ASSURANCE		
		Low	Medium	High
OSO #17 Remote crew is fit to operate	Criteria	The policy to define how the remote crew declares themselves fit to operate (before an operation) is documented. The remote crew fit-to-operate declaration (before an operation) is based on a policy defined by the applicant.	Same as low. In addition: — Remote crew duty, flight duty and the resting time policy are documented. — Remote crew duty cycles are logged and cover at a minimum: — when the remote crew member’s duty day commences, — when the remote crew members are free from duties, and	Same as medium. In addition: — Medical standards considered adequate by the competent authority and/or the means of compliance acceptable to that authority are established and the competent authority of the MS or an entity that is designated by the competent authority verifies that the remote crew is medically fit.

			— resting times within the duty cycle. — There is evidence that the remote crew is fit to operate the UAS.	— The competent authority of the MS or an entity that is designated by the competent authority validates the duty/flight duty times. — If an FRMS is used, it is validated and monitored by the competent authority of the MS or an entity that is designated by the competent authority.
	Comments	N/A	N/A	N/A

OSO #18 — Automatic protection of the flight envelope from human errors

- Each UA is designed with a flight envelope that describes its safe performance limits with regard to minimum and maximum operating speeds, and its operating structural strength.
- Automatic protection of the flight envelope is intended to prevent the remote pilot from operating the UA outside its flight envelope. If the applicant demonstrates that the remote-pilot is not in the loop, this OSO is not applicable.
- A UAS implementing such an automatic protection function will ensure that the UA is operated within an acceptable flight envelope margin even in the case of incorrect remote-pilot control inputs (human errors).
- UAS without automatic protection functions are susceptible to incorrect remote-pilot control inputs (human errors), which can result in the loss of the UA if the designed performance limits of the aircraft are exceeded.
- Failures or development errors of the flight envelope protection are addressed in OSOs #5, #10 and #12.

HUMAN ERROR		LEVEL of INTEGRITY		
		Low	Medium	High
OSO #18 Automatic protection of the flight envelope from human errors	Criteria	The UAS flight control system incorporates automatic protection of the flight envelope to prevent the remote pilot from making any <u>single</u> input under <u>normal operating conditions</u> that would cause the UA to exceed its flight envelope or prevent it from recovering in a timely fashion.	The UAS flight control system incorporates automatic protection of the flight envelope to ensure the UA remains within the flight envelope or ensures a timely recovery to the designed operational flight envelope <u>following remote pilot error(s)</u> . ¹	
	Comments	N/A	¹ The distinction between a medium and a high level of robustness for this criterion is achieved through the level of assurance (see table below).	

HUMAN ERROR		LEVEL of ASSURANCE		
		Low	Medium	High
OSO #18 Automatic protection of the flight envelope from human errors	Criteria	The automatic protection of the flight envelope has been developed in-house or out of the box (e.g. using commercial off-the-shelf elements), without following specific standards.	The competent authority should request the applicant to use a UAS for which EASA has verified the claimed integrity through a DVR.	The competent authority should request the applicant to use a UAS for which EASA has issued a type certificate or restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012.
	Comments	N/A	N/A	N/A

OSO #19 — Safe recovery from human errors

- (a) This OSO addresses the risk of human errors which may affect the safety of the operation if not prevented or detected and recovered in a timely fashion.
- i) Errors can be made by anyone involved in the operation.
 - ii) An example could be a human error leading to the incorrect loading of the payload, with the risk of it falling off the UA during the operation.
 - iii) Another example could be a human error not to extend the antenna mast, thus reducing the C2 link coverage.
- Note: the flight envelope protection is excluded from this OSO since it is specifically covered by OSO #18.
- (b) This OSO covers:
- i) procedures and lists,
 - ii) training, and
 - iii) UAS design, i.e. systems detecting and/or recovering from human errors (e.g. safety pins, use of acknowledgment features, fuel or energy consumption monitoring functions ...)

HUMAN ERROR		LEVEL of INTEGRITY		
		Low	Medium	High
OSO #19	Criterion #1	Procedures and checklists that mitigate the risk of potential human errors from any person involved with the mission are defined and used.		

Safe recovery from Human Error	(Procedures and checklists)	Procedures provide at a minimum: — a clear distribution and assignment of tasks, and — an internal checklist to ensure staff are adequately performing their assigned tasks.		
	Comments	N/A	N/A	N/A
	Criterion #2 (Training)	— The remote crew ¹ is trained to use procedures and checklists. — The remote crew ¹ receives CRM ² training. ³		
	Comments	¹ In the context of SORA, the term 'remote crew' refers to any person involved in the mission. ² CRM training focuses on the effective use of all the remote crew to ensure a safe and efficient operation, reducing error, avoiding stress and increasing efficiency. ³ The distinction between a low, a medium and a high level of robustness for this criterion is achieved through the level of assurance (see table below).		
	Criterion #3 (UAS design)	Systems detecting and/or recovering from human errors are developed according to industry best practices.	Systems detecting and/or recovering from human errors are developed to standards considered adequate by the competent authority and/or in accordance with a means of compliance acceptable to that authority.	Same as medium.
	Comments	N/A	N/A	N/A

HUMAN ERROR		LEVEL of ASSURANCE		
		Low	Medium	High
OSO #19 Safe recovery from human error	Criterion #1 (Procedures and checklists)	(a) Procedures and checklists are not validated against either a standard or a means of compliance considered adequate by the competent authority of the MS. (b) The adequacy of the procedures and checklists is declared.	(a) Procedures and checklists are validated against standards considered adequate by the competent authority of the MS and/or in accordance with the means of compliance acceptable to that authority ¹ . (b) The adequacy of the procedures and checklists is proven through: (1) dedicated flight tests, or (2) simulation, provided that the representativeness of the simulation means is proven valid for the intended purpose with positive results; or (3) any other means acceptable to the competent authority of the MS.	Same as medium. In addition: (a) Flight tests performed to validate the procedures and checklists cover the complete flight envelope or are proven to be conservative. (b) The procedures, checklists, flight tests and simulations are validated by the competent authority of the MS or an entity that is designated by the competent authority.

HUMAN ERROR		LEVEL of ASSURANCE		
		Low	Medium	High
	Comments	N/A	¹ AMC2 UAS.SPEC.030(3)(e) (Operational procedures for medium and high levels of robustness) is considered an acceptable means of compliance.	N/A
	Criterion #2 (Training)	Consider the criteria defined for the level of assurance of the generic remote crew training OSO (i.e. OSO #09, OSO #15 and OSO #22) corresponding to the SAIL of the operation.		
	Comments	N/A	N/A	N/A
	Criterion #3 (UAS design)	The applicant declares that the required level of integrity has been achieved ¹ .	The applicant has supporting evidence that the required level of integrity is achieved. That evidence is provided through testing, analysis, simulation ² , inspection, design review or operational experience. If the operation is classified as SAIL IV, the competent authority should request the applicant to use a UAS for which EASA has verified the claimed integrity through a DVR. If the operation is classified as SAIL V the competent authority should request the applicant to use a UAS for which EASA has issued a type certificate or restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012.	The competent authority should request the applicant to use a UAS for which EASA has issued a type certificate or restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012.
	Comments	¹ Supporting evidence may or may not be available.	² When simulation is performed, the validity of the targeted environment that is used in the simulation needs to be justified.	N/A

OSO #20 — A human factors evaluation has been performed and the HMI has been found appropriate for the mission

HUMAN ERROR		LEVEL of INTEGRITY		
		Low	Medium	High
OSO #20	Criteria	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.		

A Human Factors evaluation has been performed and the HMI found appropriate for the mission	Comments	<i>If an electronic means is used to support potential VOs in their role to maintain awareness of the position of the unmanned aircraft, its HMI:</i> — <i>is sufficient to allow the VOs to determine the position of the UA during operation; and</i> — <i>does not degrade the VO's ability to:</i> — <i>scan the airspace visually where the unmanned aircraft is operating for any potential collision hazard; and</i> — <i>maintain effective communication with the remote pilot at all times.</i>

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

E.8 OSOs related to adverse operating conditions

OSO #23 — Environmental conditions for safe operations are defined, measurable and adhered to

ADVERSE OPERATING CONDITIONS		LEVEL of INTEGRITY		
		Low	Medium	High
OSO #23 Environmental conditions for safe operations are defined,	Criterion #1 (Definition)	The environmental conditions for safe operations are defined and reflected in the flight manual or equivalent document. ¹		
	Comments	¹ The distinction between a low, a medium and a high level of robustness for this criterion is achieved through the level of assurance (see table below).		
	Criterion #2 (Procedures)	Procedures to evaluate environmental conditions before and during the mission (i.e. real-time evaluation) are available and include assessment of meteorological conditions (METAR, TAFOR, etc.) with a simple recording system. ²		

measurable and adhered to	Comments	² The distinction between a low, a medium and a high level of robustness for this criterion is achieved through the level of assurance (see table below).
	Criterion #3 (Training)	Training covers assessment of meteorological conditions. ³
	Comments	³ The distinction between a low, a medium and a high level of robustness for this criterion is achieved through the level of assurance (see table below).

ADVERSE OPERATING CONDITIONS		LEVEL of ASSURANCE		
		Low	Medium	High
OSO #23 Environmental conditions for safe operations defined, measurable and adhered to	Criterion #1 (Definition)	The applicant declares that the required level of integrity has been achieved.	The applicant has supporting evidence that the required level of integrity is achieved. This is typically done by testing, analysis, simulation, inspection, design review or through operational experience. If the operation is classified as SAIL IV, the competent authority should request the applicant to use a UAS for which EASA has issued a DVR.	The competent authority should request the applicant to use a UAS for which EASA has issued a type certificate or restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012
	Comments	N/A		
	Criterion #2 (Procedures)	(a) Procedures do not require validation against either a standard or a means of compliance considered adequate by the competent authority of the MS. (b) The adequacy of the procedures and checklists is declared.	(a) Procedures are validated against standards considered adequate by the competent authority of the MS and/or in accordance with the means of compliance acceptable to that authority ¹ . (b) The adequacy of the procedures is proven through: (1) dedicated flight tests, or (2) simulation, provided that the representativeness of the simulation means is proven valid for the intended purpose with positive results; or (3) any other means acceptable to the competent authority of the MS.	Same as medium. In addition: (a) Flight tests performed to validate the procedures cover the complete flight envelope or are proven to be conservative. (b) The procedures, flight tests and simulations are validated by the competent authority of the MS or an entity that is designated by the competent authority.
	Comments	N/A	¹ AMC2 UAS.SPEC.030(3)(e) (Operational procedures for medium and high levels of robustness) is considered an acceptable means of compliance.	N/A

	Criterion #3 (Training)	Training is self-declared (with evidence available).	— Training syllabus is available. — The UAS operator provides competency-based, theoretical and practical training.	The competent authority of the MS or an entity that is designated by the competent authority: — validates the training syllabus; and — verifies the remote crew competencies.
	Comments	N/A	N/A	N/A

OSO #24 — UAS is designed and qualified for adverse environmental conditions (e.g. adequate sensors, DO-160 qualification)

(a) To assess the integrity of this OSO, the applicant determines:

- (1) whether credit can be taken for the equipment environmental qualification tests / declarations, e.g. by answering the following questions:
 - (i) Is there a Declaration of Design and Performance (DDP) available to the applicant stating the environmental qualification levels to which the equipment was tested?
 - (ii) Did the environmental qualification tests follow a standard considered adequate by the competent authority (e.g. DO-160)?
 - (iii) Are the environmental qualification tests appropriate and sufficient to cover all the environmental conditions related to the ConOps?
 - (iv) If the tests were not performed following a recognised standard, were the tests performed by an organisation/entity that is qualified or that has experience in performing DO-160 like tests?
- (2) Can the suitability of the equipment for the intended/expected UAS environmental conditions be determined from either in-service experience or relevant test results?
- (3) Any limitations which would affect the suitability of the equipment for the intended/expected UAS environmental conditions.

(b) The lowest integrity level should be considered for those cases where a UAS equipment has only a partial environmental qualification and/or a partial demonstration by similarity and/or parts with no qualification at all.

ADVERSE OPERATING CONDITIONS		LEVEL of INTEGRITY		
		N/A	Medium	High
OSO #24	Criteria	N/A	The UAS is designed to limit the effect of environmental conditions.	The UAS is designed using environmental standards considered adequate by the competent

UAS is designed and qualified for adverse environmental conditions				authority and/or in accordance with a means of compliance acceptable to that authority.
	Comments	N/A	N/A	N/A

ADVERSE OPERATING CONDITIONS		LEVEL of ASSURANCE		
		N/A	Medium	High
OSO #24 UAS is designed and qualified for adverse environmental conditions	Criteria	N/A	The applicant has supporting evidence that the required level of integrity has been achieved. This is typically done by testing, analysis, simulation ² , inspection, design review or through operational experience.	If the operation is classified as SAIL IV, the competent authority should request the applicant to use a UAS for which EASA has issued a DVR. If the operation is classified SAIL V or VI, the competent authority should request the applicant to use a UAS for which EASA has issued a type certificate or restricted type certificate in accordance with Annex I (Part 21) to Regulation (EU) No 748/2012.
	Comments	N/A	² When simulation is performed, the validity of the targeted environment that is used in the simulation needs to be justified	N/A

AMC2 Article 11 Rules for conducting an operational risk assessment

ED Decision 2023/012/R

PREDEFINED RISK ASSESSMENT PDRA-G01 Version 1.3

EDITION September 2023

(a) Scope

This PDRA is the result of applying the methodology that is described in [AMC1 Article 11](#) of the UAS Regulation to UAS operations that are conducted in the ‘specific’ category:

- (1) with UA with maximum characteristic dimensions (e.g. wingspan, rotor diameter/area or maximum distance between rotors in case of multirotor) of up to 3 m and typical kinetic energy of up to 34 kJ;
- (2) BVLOS of the remote pilot with visual air risk mitigation;
- (3) over sparsely populated areas;
- (4) less than 150 m (500 ft) above the surface overflown (or any other altitude reference defined by the Member State); and
- (5) in uncontrolled airspace.

(b) PDRA characterisation and conditions

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

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
1. Operational characterisation (scope and limitations)				
Level of human intervention		1.1 No autonomous operations: the remote pilot should have the ability to maintain control of the UA, except in case of a loss of the command and control (C2) link.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’
		1.2 The remote pilot should operate only one UA at a time.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’

¹ To be filled in by the UAS operator.

² To be filled in by the UAS operator.

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
	Self-declaration	1.3 The remote pilot should not operate the UA from a moving vehicle.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.4 The remote pilot should not hand the control of the UA over to another command unit.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
UA range limit	Self-declaration	1.5 <u>Launch/recovery</u> : at VLOS distance from the remote pilot, if not operating from a safe prepared area. <i>Note: 'safe prepared area' means a controlled ground area that is suitable for the safe launch/recovery of the UA.</i>	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.6 <u>In flight</u> : 1.6.1 <u>If no AOs are employed</u> : the UA is not operated further than 1 km (or other distance defined by the competent authority) from the remote pilot. <i>Note: The remote pilot's workload should allow them to continuously visually scan the airspace.</i>	<i>Please include a reference to the relevant chapter of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		1.6.2 <u>If AOs are employed</u> : the range is not limited as long as the UA is not operated further than 1 km (unless a different distance is defined by the competent authority) from the AO who is nearest to the UA.	<i>Please include a reference to the relevant chapter of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
Overflown areas	Declaration supported by data	1.7 UAS operations should be conducted over sparsely populated areas.	<i>Please include a reference to the relevant chapter of the OM where the procedures for determining the population density are provided.</i>	'I declare compliance.' Please describe how population density data is identified.

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
UA limitations	Self-declaration	1.8 Maximum characteristic dimensions (e.g. wingspan, rotor diameter/area or maximum distance between rotors in case of a multirotor): 3 m	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.9 Typical kinetic energy (as defined in paragraph 2.3.1(k) of AMC1 to Article 11 of the UAS Regulation: up to 34 kJ	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Flight height limit	Self-declaration	1.10 The maximum height of the operational volume should not be greater than 150 m (500 ft) above the overflow area (or any other altitude reference defined by the Member State). <i>Note: In addition to the vertical limit of the operational volume, an air risk buffer is to be considered (see 'Air risk' under point 3 of this table).</i>	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Airspace	Self-declaration	1.11 The UA should be operated:		
		1.11.1 in uncontrolled airspace (corresponding to an air risk that can be classified as ARC-b); or	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.11.2 in a segregated area (corresponding to an air risk that can be classified as ARC-a); or	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.11.3 as otherwise established by the Member States in accordance with Article 15 (with an associated air risk that can be classified as not higher than ARC-b).	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Visibility	Self-declaration	1.12 The UA should be operated in an area where flight visibility is greater than 5 km. <i>Note: Please refer to GM1 UAS.STS-02.020(3).</i>	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions					
Topic	Method of proof	Condition		Integrity ¹	Proof ²
Others	Self-declaration	1.13	The UA should not be used to drop material or to carry dangerous goods, except for dropping items in connection with agricultural, horticultural or forestry activities where the carriage of such items does not contravene any other applicable regulations.	Please include a reference to the relevant chapter/section of the OM.	'I declare compliance.'
2. Operational risk classification (according to the classification defined in AMC1 to Article 11 of the UAS Regulation)					
Final GRC	3	Final ARC	ARC-b	SAIL	II
3. Operational mitigations					
Operational volume (see Figure 2 of AMC1 Article 11)	Self-declaration	3.1	To determine the operational volume, the applicant should consider the position-keeping capabilities of the UAS in 4D space (latitude, longitude, height, and time).	Please include a reference to the relevant chapter/section of the OM.	'I declare compliance.'
		3.2	In particular, the accuracy of the navigation solution, the flight technical error of the UAS, as well as the flight path definition error (e.g. map error) and latencies should be considered and addressed when determining the operational volume.	Please include a reference to the relevant chapter/section of the OM.	'I declare compliance.'
		3.3	The remote pilot should apply emergency procedures as soon as there is an indication that the UA may exceed the limits of the operational volume.	Please include a reference to the relevant chapter/section of the OM.	'I declare compliance.'
Ground risk		3.4	The UAS operator should establish a ground risk buffer to protect third parties on the ground outside the operational volume.	Please include a reference to the relevant chapter/section of the OM.	'I declare compliance.'
		3.4.1	The minimum criterion should be the use of the '1:1 rule' (e.g. if the UA is planned to operate at a height of 150 m,	Please include a reference to the relevant chapter/section of the OM.	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
	Self-declaration	the ground risk buffer should at least be 150 m).		
		3.5 The operational volume and the ground risk buffer should be all contained in a sparsely populated area.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.6 The applicant should evaluate the area of operations typically by means of an on-site inspection or appraisal, and should be able to justify a lower density of people at risk in the operational area and the ground risk buffer.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Air risk	Self-declaration	3.7 The UAS operator should establish an air risk buffer to protect third parties in the air outside the operational volume.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.8 This air risk buffer should be contained in an 'airspace that meets the conditions defined in 1.11 and over sparsely populated areas. If the operation is limited at a height below 120 m, no additional vertical air risk buffer is required.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.' If the height of the operation is above 120 m and up to 150 m, please add the following: 'Supporting evidence is included in the OM.' 'Justification supporting the appropriate air risk buffer is documented in [...].'
		3.9 The operational volume should be outside any geographical zone corresponding to a flight restriction zone, as defined by the responsible authority, unless the UAS operator has been granted appropriate permission.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.10 Prior to the flight, the remote pilot should assess the proximity of the planned operation to manned aircraft activity.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
	Declaration supported by data	3.11 If the UAS operation is performed above 120 m and up to 150 m, the UAS operator should develop appropriate procedures to not jeopardise other airspace users.	<i>Please include a reference to the relevant chapter/section of the OM. Please describe how the remote pilots and, if employed, the AOs are able to assess the height of the UA compared to other airspace users³</i>	'I declare compliance and supporting evidence is included in the OM.'
Observers⁴	Self-declaration	3.12 If the UAS operator decides to employ one or more airspace observers (AOs), the remote pilot may operate the UA up to the distance that is specified in point 1.6.2.	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		3.13 The UAS operator should ensure the correct placement and the appropriate number of AOs along the intended flight path. Prior to each flight, the UAS operator should verify that:	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		3.13.1 the visibility and the planned distance of the AOs are within the acceptable limits that are defined in the operations manual (OM);	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		3.13.2 there are no potential terrain obstructions for each AO;	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		3.13.3 there are no gaps between the zones that are covered by each of the AOs;	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		3.13.4 communication with each AO is established and effective; and	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'

³ The UAS operator should demonstrate that they have sufficient confidence in the accuracy of the information about the height of the UA and the means to advert and avoid other airspace users and obstacles in the vicinity of the UA.

⁴ Please refer to point [UAS.STS-02.050](#) for the AO's main responsibilities.

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		3.13.5 if means are used by the AOs to determine the position of the UA, those means are functioning and effective. <i>Note: Instead of an AO, the remote pilot may perform the visual scan of the airspace, provided that the workload allows them to perform their duties.</i>	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
4. UAS operator and UAS operations conditions				
UAS operator and UAS operations	Declaration supported by data	4.1 The UAS operator should:		
		4.1.1 develop an operations manual (OM) (for the template, refer to AMC1 UAS.SPEC.030(3)(e) and to the complementary information in GM1 UAS.SPEC.030(3)(e));	<i>Please describe how this condition is met.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.2 develop procedures to ensure that the security requirements applicable to the area of operations are complied with during in the intended operation;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.3 develop measures to protect the UAS against unlawful interference and unauthorised access;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.4 develop procedures to ensure that all operations comply with Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data; in particular, the UAS operator should carry out a data protection impact assessment, when this is required by the data protection national authority of the Member State with regard to the	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		application of Article 35 of that Regulation;		
		4.1.5 develop guidelines for its remote pilots to plan UAS operations in a manner that minimises nuisance, including noise and other emissionsrelated nuisance, to people and animals;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.6 develop an emergency response plan (ERP) in accordance with the conditions for a 'medium' level of robustness (please refer to AMC3 UAS.SPEC.030(3)(e) ;	<i>Please describe how this condition is met.</i>	'I declare compliance and that the ERP is available to the competent authority for review.'
		4.1.7 validate the operational procedures in accordance with the conditions for a 'medium' level of robustness, which are included in AMC2 UAS.SPEC.030(3)(e) ;	<i>Please describe how this condition is met.</i>	'I declare compliance and that the description for meeting this condition is available to the competent authority for review.'
		4.1.8 ensure the adequacy of the contingency and emergency procedures, and prove it through any of the following: (a) dedicated flight tests; or (b) simulations, provided that the representativeness of the simulation means is proven for the intended purpose with positive results; or (c) any other means acceptable to the competent authority;	<i>Please describe how this condition is met.</i>	'I declare compliance and that the description for meeting this condition is available to the competent authority for review.'
		4.1.9 have a policy that defines how the remote pilot and any other personnel in charge of duties essential to the UAS operation can declare themselves fit to operate before conducting any operation;	<i>Please describe how this condition is met.</i>	'I declare compliance and that the description for meeting this condition is available to the competent authority for review.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		4.1.10 designate for each flight a remote pilot with adequate competency and other personnel in charge of duties essential to the UAS operation if needed;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.11 ensure that the UAS operation effectively uses and supports the efficient use of the radio spectrum in order to avoid harmful interference;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.12 keep for a minimum of 3 years and maintain up to date a record of the information on UAS operations, including any unusual technical or operational occurrences and other data as required by the declaration or by the operational authorisation.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that recordkeeping data is available to the competent authority for review.'
UAS maintenance	Self-declaration	4.2 The UAS operator should:		
		4.2.1 ensure that the UAS maintenance instructions that are defined by the UAS operator are included in the OM and cover at least the UAS manufacturer's instructions and requirements, when applicable;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		4.2.2 ensure that the maintenance staff follow the UAS maintenance instructions when performing maintenance;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		4.2.3 keep for a minimum of 3 years and maintain up to date a record of the maintenance activities conducted on the UAS;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		4.2.4 establish and keep up to date a list of the maintenance staff employed by the	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
External services	Self-declaration	UAS operator to carry out maintenance activities;		
		4.2.5 comply with point UAS.SPEC.100 , if the UAS uses certified equipment;	<i>Please include a reference to the relevant chapter/section of the OM or n/a.</i>	'I declare compliance.' or 'n/a'
		4.3 The UAS operator should ensure that the level of performance for any externally provided service that is necessary for the safety of the flight is adequate for the intended operation. The UAS operator should declare that this level of performance is adequately achieved.	<i>Please describe how this condition is met.</i>	'I declare compliance.'
		4.4 The UAS operator should define and allocate the roles and responsibilities between the UAS operator and the external service provider(s), if applicable.	<i>Please describe how this condition is met.</i>	'I declare compliance.'
5. Conditions for the personnel in charge of duties essential to the UAS operation				
General	Declaration supported by data	5.1 The UAS operator should ensure that all personnel in charge of duties essential to the UAS operation are provided with competency-based, theoretical and practical training specific to their duties, which consists of the applicable theoretical elements derived from AMC1 UAS.SPEC.050(1)(d) , and practical elements from AMC2 UAS.SPEC.050(1)(d) and UAS.SPEC.050(1)(e) . In addition, for non-remote pilots, also from AMC3 UAS.SPEC.050(1)(d) .	<i>Please describe how this condition is met.</i>	'I declare compliance.' Evidence of training is available for inspection at the request of the competent authority or its authorised representative. The training programme is documented in the OM.
		5.2 The UAS operator should keep and maintain up to date a record of all the relevant qualifications and training courses completed by the remote pilot and the	<i>Please describe how this condition is met.</i>	'I declare compliance.' Record-keeping data is available for inspection at the request of the competent authority.

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		other personnel in charge of duties essential to the UAS operation and by the maintenance staff for at least 3 years after those persons have ceased to be employed by the organisation or have changed position within the organisation.		
Remote pilot	Self-declaration	5.3 The remote pilot should have the authority to cancel or delay any or all flight operations under the following conditions:		
		5.3.1 when the safety of persons is jeopardised; or	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.3.2 when property on the ground is jeopardised; or	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.3.3 when other airspace users are jeopardised; or	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.3.4 when there is a violation of the terms of the operational authorisation.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.4 If AOs are employed, the remote pilot should ensure that the necessary number of AOs is available and correctly placed, and that the communication with them can be adequately established.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.5 The remote pilot should:		
		5.5.1 not perform duties under the influence of psychoactive substances or alcohol, or when they are unfit to perform their tasks due to injury, fatigue, medication, sickness or other causes;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.5.2 be familiar with the manufacturer's instructions provided by the manufacturer of the UAS;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.5.3 ensure that the UA remains clear of clouds;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		5.5.4 perform unaided visual scan of the airspace and ensure that the AO(s) can perform the same, if required, to avoid any potential collision hazard;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.5.5 obtain updated information relevant to the intended operation about any geographical zones defined in accordance with Article 15 of the UAS Regulation; and	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.5.6 ensure that the UAS is in a safe condition to complete the intended flight safely, and if applicable, check whether the direct remote identification is active and up to date.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Multi-crew cooperation (MCC)	Self-declaration	5.6 Where multi-crew cooperation (MCC) is required, the UAS operator should:		
		5.6.1 designate the remote pilot-in-command to be responsible for each flight;	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		5.6.2 include procedures to ensure coordination between the remote crew members through robust and effective communication channels; those procedures should cover, as a minimum:	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		5.6.2.1 the assignment of tasks to the remote crew members; and	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		5.6.2.2 the establishment of step-by-step communication; and	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		5.6.3 ensure that the training of the remote crew covers MCC.	Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.	'I declare compliance.' or 'n/a'
Maintenance staff	Declaration supported by data	5.7 Any maintenance staff member that is authorised by the UAS operator to perform maintenance activities should have been adequately trained in the documented maintenance procedures	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.' Evidence of training is available at the request of the competent authority.
Personnel in charge of duties essential to the UAS operation are fit to operate	Self-declaration	5.8 The personnel in charge of duties essential to the UAS operation should declare that they are fit to operate before conducting any operation, based on the policy that is defined by the UAS operator.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
6. Technical conditions				
		6.1 The UAS should be equipped with means to monitor the critical parameters of a safe flight, in particular the following:		
		6.1.1 the UA position, height or altitude, ground speed or airspeed, attitude and trajectory;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	I declare compliance.'
		6.1.2 the UAS energy status (fuel, battery charge, etc.); and	<i>Please include a reference to the relevant chapter/section of the OM.</i>	I declare compliance.'
		6.1.3 the status of critical functions and systems; as a minimum, for services based on RF signals (e.g. C2 Link, GNSS, etc.), means should be provided to monitor the adequate performance and trigger an alert when the performance level becomes too low.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	I declare compliance.'
		6.2 The UA should have the performance capability to descend safely from its operating altitude to a 'safe altitude' in less	<i>Please include a reference to the relevant chapter/section of the OM.</i>	I declare compliance.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		than 1 minute, or have a descent rate of at least 2.5 m/s (500 fpm).		
Human-machine interface (HMI)	Self-declaration	6.3 The UAS information and control interfaces should be clearly and succinctly presented and should not confuse, cause unreasonable fatigue, or contribute to causing any disturbance to the personnel in charge of duties essential to the UAS operation in such a way that could adversely affect the safety of the operation.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.4 If an electronic means is used to support AOs in their role of maintaining awareness of the position of the UA, its HMI should:		
		6.4.1 be sufficiently easy to understand to allow AOs to determine the position of the UA during the operation; and	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'</i>	'I declare compliance.' or 'n/a'
		6.4.2 not degrade the AOs' ability to:		
		6.4.2.1 perform unaided visual scan of the airspace where the UA is operating for any potential collision hazard; and	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'</i>	'I declare compliance.' or 'n/a'
		6.4.2.2 maintain effective communication with the remote pilot at all times.	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'</i>	'I declare compliance.' or 'n/a'
		6.5 The UAS operator should conduct a UAS evaluation that considers and addresses human factors to determine whether the HMI is appropriate for the operation.	<i>Please describe how this condition is met.</i>	'I declare compliance.'
C2 links and communication		6.6 The UAS should comply with the applicable requirements for radio equipment and the use of the RF spectrum.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
	Self-declaration	6.7 Protection mechanisms against interference should be used, especially if unlicensed bands (e.g. ISM) are used for the C2 link (mechanisms such as FHSS, DSSS or OFDM technologies, or frequency deconfliction by procedure).	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.8 The UAS should be equipped with a C2 link that is protected against unauthorised access to the command-and-control functions.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.9 In case of a loss of the C2 link, the UAS should have a reliable and predictable method to recover the command-and-control link of the UA or to terminate the flight in a way that reduces any undesirable effect on third parties in the air or on the ground.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.10 Communication between the remote pilot and the AO(s) should allow the remote pilot to manoeuvre the UA with sufficient time to avoid any risk of collision with manned aircraft, in accordance with point UAS.SPEC.060(3)(b) of the UAS Regulation.	<i>Please describe how this condition is met.</i>	'I declare compliance.'
Tactical mitigation	Self-declaration	6.11 The UAS design should be adequate to ensure that the time required between a command given by the remote pilot and the UA executing it does not exceed 5 seconds.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.12 Where an electronic means is used to assist the remote pilot and/or AOs in being aware of the UA position in relation to potential 'airspace intruders', the information is provided with a latency and an update rate	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		for intruder data (e.g. position, speed, altitude, track) that support the decision criteria.		
Containment	Declaration supported by data	6.13 To ensure a safe recovery from a technical issue that involves the UAS or an external system that supports the operation, the UAS should comply with the following basic containment provisions:		
		6.13.1 no probable failure of the UAS or of any external system that supports the operation would lead to operation outside the operational volume; and	<i>Please describe how this condition is met</i>	'n/a since enhanced containment applies.' or 'I declare compliance.' 'A design and installation appraisal is available and it covers at least: — the design and installation features (independence, separation, and redundancy); and — the particular risks (e.g. hail, ice, snow, electromagnetic interference, etc.) relevant to the type of operation.'
		6.13.2 it is reasonably expected that a fatality will not occur due to any probable failure of the UAS or of any external system that supports the operation.	<i>Please describe how this condition is met</i>	
		6.14 The vertical extension of the operational volume should be 150 m above the surface (or any other reference altitude defined by the Member State). <i>Note: The term 'probable' should be understood in its qualitative interpretation, i.e. 'anticipated to occur one or more times during the entire system/operational life of an item'.</i>	<i>Please describe how this condition is met</i>	
		6.15 The following enhanced containment conditions should apply if the adjacent area includes an assembly of people or if the adjacent airspace is classified as ARC-d (in accordance with SORA):		

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
	Declaration supported by data	6.15.1 The UAS should be designed to standards that are considered adequate by the competent authority and/or in accordance with a means of compliance that is acceptable to that competent authority such that:	<i>Please include a reference to the relevant chapter/section of the OM or indicate 'n/a'.</i>	'N/A since the basic containment applies' or 'I declare compliance with MoC Light-UAS.2511. Analysis and/or test data with supporting evidence is available.' or 'The UAS has a DVR demonstrating compliance with the enhanced containment requirements.'
		6.15.1.1. the probability of the UA leaving the operational volume should be less than 10^{-4} /FH; and	<i>Please include a reference to the relevant chapter/section of the OM or indicate 'n/a'.</i>	
		6.15.1.2 no single failure of the UAS or of any external system that supports the operation should lead to operation outside the ground risk buffer. <i>Note: The term 'failure' should be understood as an occurrence that affects the operation of a component, part, or element in such a way that it can no longer function as intended. Errors may cause failures but are not considered to be failures. Some structural or mechanical failures may be excluded from this criterion if it can be shown that these mechanical parts were designed according to aviation industry best practices.</i>	<i>Please include a reference to the relevant chapter/section of the OM or indicate 'n/a'.</i>	

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		6.15.2 SW and AEH whose development error(s) could directly lead to operations outside the ground risk buffer should be developed according to an industry standard or methodology that is recognised as adequate by EASA. <i>Note 1: The proposed additional safety conditions cover both the integrity and the assurance levels.</i> <i>Note 2: The proposed additional safety conditions do not imply a systematic need to develop the SW and AEH according to an industry standard or methodology that is recognised as adequate by the competent authority. For instance, if the UA design includes an <u>independent</u> engine shutdown function that systematically prevents the UA from exiting the ground risk buffer due to single failures or an SW/AEH error of the flight controls from occurring, the intent of the conditions of point 6.15.1 above could be considered met.</i>	<i>Please include a reference to the relevant chapter/section of the OM or indicate 'n/a'.</i>	
Remote identification ³	Self-declaration	6.16 The UAS has a unique serial number compliant with standard ANSI/CTA2063-A-2019, Small Unmanned Aerial Systems Serial Numbers, 2019, according to Article 40(4) of Regulation (EU) 2019/945.	<i>Please describe how this condition is met.</i>	I declare compliance.'

³ Applicable from 1 July 2022.

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		6.17 the UAS is equipped with a remote identification system according to Article 40(5) of Regulation (EU) 2019/945.	<i>Please describe how this condition is met.</i>	I declare compliance.'
Lights ³	Self-declaration	6.18 If the UAS is operated at night, it is equipped with at least one green flashing light according to point UAS.SPEC.050(1)(I)(i) of the UAS Regulation.	<i>Please describe how this condition is met.</i>	'I declare compliance.' or 'n/a'

Table PDRA-G01.1 — Main limitations and conditions for PDRA-G01

³ Applicable from 1 July 2022.

AMC3 Article 11 Rules for conducting an operational risk assessment

ED Decision 2023/012/R

PREDEFINED RISK ASSESSMENT PDRA-G02 Version 1.2

EDITION September 2023

(a) Scope

This PDRA is the result of applying the methodology that is described in [AMC1 to Article 11](#) of the UAS Regulation to UAS operations conducted in the ‘specific’ category with the following main attributes:

- (1) UA with maximum characteristic dimensions (e.g. wingspan, rotor diameter/area or maximum distance between rotors in case of a multicopter) of up to 3 m and typical kinetic energies of up to 34 kJ;
- (2) BVLOS of the remote pilot;
- (3) over sparsely populated areas;
- (4) in airspace that is reserved or segregated for the UAS operation, corresponding to an air risk that can be classified as ARC-a.
- (5) within the range of the direct C2 link¹ (radio line of sight) up to the height of the upper boundary of the reserved airspace.

(b) PDRA characterisation and conditions

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

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ²	Proof ³
1. Operational characterisation (scope and limitations)				
Level of human intervention		1.1 No autonomous operations: the remote pilot should have the ability to maintain	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’

¹ Due to the lack of experience in the use of communication services for extending the C2 link coverage through communication networks (e.g. mobile networks) in the type of UAS operations that are addressed by this PDRA, the scope of the PDRA is initially limited to the coverage of a direct C2 Link (direct link between the control station and the UA). As more experience in the use of those communication services is gained, the conditions of this PDRA may be revised to encompass their uses.

² To be filled in by the UAS operator.

³ To be filled in by the UAS operator.

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
	Self-declaration	control of the UA, except in case of a loss of the command-and-control (C2) link.		
		1.2 The remote pilot should operate only one UA at a time.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.3 The remote pilot should not operate the UA from a moving vehicle.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.4 The remote pilot should not hand the control of the UA over to another command unit.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
UA range limit	Self-declaration	1.5 Launch/recovery: At VLOS distance from the remote pilot, if not operating from a safe prepared area. <i>Note: 'safe prepared area' means a controlled ground area that is suitable for the safe launch/recovery of the UA.</i>	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.6 In flight: The range limit should be within the coverage of the direct C2 link coverage (radio line of sight), which ensures the safe conduct of the flight.	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
Overflown areas	Declaration supported by data	1.7 UAS operations should be conducted over sparsely populated areas.	<i>Please include a reference to the relevant chapter/section of the OM where the procedures for determining the population density are provided.</i>	'I declare compliance.' <i>Please describe how the population density data is identified.</i>
UA limitations	Self-declaration	1.8 Maximum characteristic dimension (e.g. wingspan, rotor diameter/area or maximum distance between rotors in case of a multirotor): 3 m	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.9 Typical kinetic energy (as defined in paragraph 2.3.1(k) of AMC1 to Article 11 of the UAS Regulation: up to 34 kJ	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions					
Topic	Method of proof	Condition	Integrity ¹	Proof ²	
Flight height limit	Self-declaration	1.10 The maximum height of the operation volume is limited by the size of the reserved or segregated airspace. <i>Note: In addition to the vertical limit of the operational volume, an air risk buffer is to be considered (see ‘Air risk’ under point 3 of this table).</i>	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’	
Airspace	Self-declaration	1.11 Operations should only be conducted in airspace that is reserved or segregated for the purpose of conducting UAS operations (corresponding to an air risk that can be classified as ARC-a).	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’	
Visibility	Self-declaration	1.12 If take-off and landing are conducted in VLOS of the remote pilot, the visibility should be sufficient to ensure that no people are in danger during the take-off/landing phase. The remote pilot should abort the take-off or landing in case people on the ground are in danger.	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate ‘n/a’.</i>	‘I declare compliance.’ or ‘n/a’	
Others	Self-declaration	1.13 The UA should not be used to drop material or to carry dangerous goods, except for dropping items in connection with agricultural, horticultural or forestry activities where the carriage of such items does not contravene any other applicable regulations.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’	
2. Operational risk classification (according to the classification defined in AMC1 to Article 11 of the UAS Regulation)					
Final GRC	3	Final ARC	ARC-a	SAIL	II
3. Operational mitigations					
Operational volume (see Figure 2)		3.1 To determine the operational volume, the UAS operator should consider the position-keeping capabilities of the UAS	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’	

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
of AMC1 Article 11)	Self-declaration	in 4D space (latitude, longitude, height, and time).		
		3.2 In particular, the accuracy of the navigation solution, the flight technical error of the UAS, as well as the flight path definition error (e.g. map error) and latencies should be considered and addressed when determining the operational volume.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.3 The remote pilot should apply the emergency procedures as soon as there is an indication that the UA may exceed the limits of the operational volume.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Ground risk	Self-declaration	3.4 The UAS operator should establish a ground risk buffer to protect third parties on the ground outside the operational volume.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.4.1 The minimum criterion should be the use of the '1:1 rule' (e.g. if the UA is planned to operate at a height of 150 m, the ground risk buffer should at least be 150 m).	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.5 The operational volume and the ground risk buffer should be all contained in a sparsely populated area.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.6 The applicant should evaluate the area of operations typically by means of an on-site inspection or appraisal, and should be able to justify a reduced density of people at risk in the operational area and the ground risk buffer.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
Air risk	Self-declaration	3.7 The operational volume, including the air risk buffer, if applicable, should be entirely contained in the reserved or segregated airspace.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Observers		n/a		
4. UAS operator and UAS operations conditions				
UAS operator and UAS operations	Declaration supported by data	4.1 The UAS operator should:		
		4.1.1 develop an operations manual (OM) (for the template, refer to AMC1 UAS.SPEC.030(3)(e) and to the complementary information in GM1 UAS.SPEC.030(3)(e));	<i>Please describe how this condition is met.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.2 develop procedures to ensure that the security requirements applicable to the area of operations are complied during the intended operation;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.3 develop measures to protect the UAS against unlawful interference and unauthorised access;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.4 develop procedures to ensure that all operations comply with Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data; in particular, the UAS operator should carry out a data protection impact assessment, when this is required by the data protection national authority of the Member State with regard to the application of Article 35 of that Regulation;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		4.1.5 develop guidelines for its remote pilots to plan UAS operations in a manner that minimises nuisance, including noise and other emissions-related nuisance, to people and animals;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.6 develop an emergency response plan (ERP) in accordance with the conditions for a 'medium' level of robustness (please refer to AMC3 UAS.SPEC.030(3)(e));	<i>Please describe how this condition is met.</i>	'I declare compliance and that the ERP is available to the competent authority for review.'
		4.1.7 validate the operational procedures in accordance with the conditions for a 'medium' level of robustness, which are included in AMC2 UAS.SPEC.030(3)(e) ;	<i>Please describe how this condition is met.</i>	'I declare compliance and that the ERP is available to the competent authority for review.'
		4.1.8 ensure the adequacy of the contingency and emergency procedures and prove it through any of the following: (a) dedicated flight tests; or (b) simulations, provided that the representativeness of the simulation means is proven for the intended purpose with positive results; or (c) any other means acceptable to the competent authority; and	<i>Please describe how this condition is met.</i>	'I declare compliance and that the description for meeting this condition is available to the competent authority for review.'
		4.1.9 have a policy that defines how the remote pilot and any other personnel in charge of duties essential to the UAS operation can declare themselves	<i>Please describe how this condition is met.</i>	'I declare compliance and that the description for meeting this condition is available to the competent authority for review.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		fit to operate before conducting any operation.		
		4.1.10 designate for each flight a remote pilot with adequate competency and other personnel in charge of duties essential to the UAS operation if needed;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.11 ensure that the UAS operation effectively uses and supports the efficient use of the radio spectrum in order to avoid harmful interference;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.12 keep for a minimum of 3 years and maintain up to date a record of the information on UAS operations, including any unusual technical or operational occurrences and other data as required by the declaration or by the operational authorisation;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that recordkeeping data is available to the competent authority.'
		4.1.13 As part of the procedures contained in the OM (point 4.1.1 above), include the description of the following:		
		(a) The method and means of communication with the authority or entity responsible for the management of the airspace during the entire period of the reserved or segregated airspace being active, as mandated by the authorisation. <i>Note: The communication method should be published in the NOTAM activating the reserved airspace to also allow coordination with manned aircraft.</i>	<i>Please describe how this condition is met</i>	'I declare compliance and that evidence is available to the competent authority for review.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		(b) The member(s) of personnel in charge of duties essential to the UAS operation, who are responsible for establishing that communication.	<i>Please describe how this condition is met</i>	'I declare compliance and that evidence is available to the competent authority for review.'
UAS maintenance	Self-declaration	4.2 The UAS operator should:		
		4.2.1 ensure that the UAS maintenance instructions that are defined by the UAS operator are included in the OM and cover at least the UAS manufacturer's instructions and requirements when applicable; and	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		4.2.2 ensure that the maintenance staff follow the UAS maintenance instructions when performing maintenance.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		4.2.3 keep for a minimum of 3 years and maintain up to date a record of the maintenance activities conducted on the UAS;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		4.2.4 establish and keep up to date a list of the maintenance staff employed by the operator to carry out maintenance activities;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		4.2.5 comply with point UAS.SPEC.100 , if the UAS uses certified equipment.	<i>Please include a reference to the relevant chapter/section of the OM or indicate 'n/a'.</i>	I declare compliance.' or 'n/a'
External services		4.3 The UAS operator should ensure that the level of performance for any externally provided service that is necessary for the safety of the flight is adequate for the intended operation. The UAS operator	<i>Please describe how this condition is met.</i>	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
	Self-declaration	should declare that this level of performance is adequately achieved.		
		4.4 The UAS operator should define and allocate the roles and responsibilities between the UAS operator and the external service provider(s), if applicable.	<i>Please describe how this condition is met.</i>	'I declare compliance.'
5. Conditions for the personnel in charge of duties essential to the UAS operation				
General	Self-declaration	5.1 The UAS operator should ensure that all personnel in charge of duties essential to the UAS operation are provided with competency-based theoretical and practical training specific to their duties, which consists of the applicable theoretical elements derived from AMC1 UAS.SPEC.050(1)(d) and practical elements from AMC2 UAS.SPEC.050(1)(d) and UAS.SPEC.050(1)(e) .	<i>Please describe this condition is met.</i>	'I declare compliance. Evidence of training are available for inspection at the request of the competent authority or its authorised representative. The training programme is documented in xxx'.
		5.2 The UAS operator should keep and maintain up to date a record of all the relevant qualifications and 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 for at least 3 years after those persons have ceased to be employed by the organisation or have changed position within the organisation.	<i>Please describe how this condition is met.</i>	'I declare compliance.' Record-keeping data is available for inspection at the request of the competent authority.
Remote pilot		5.3 The remote pilot should have the authority to cancel or delay any or all	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
	Self-declaration	flight operations under the following conditions:		
		5.3.1 when the safety of persons is jeopardised; or	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.3.2 when property on the ground is jeopardised; or	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.3.3 when other airspace users are jeopardised; or	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.3.4 when there is a violation of the terms of the operational authorisation.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.4 The remote pilot should:		
		5.4.1 not perform duties under the influence of psychoactive substances or alcohol, or when they are unfit to perform their tasks due to injury, fatigue, medication, sickness or other causes;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.4.2 be familiar with the manufacturer's instructions provided by the manufacturer of the UAS;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.4.3 obtain updated information relevant to the intended operation about any geographical zones defined in accordance with Article 15; and	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.4.4 ensure that the UAS is in a safe condition to complete the intended flight safely and, if applicable, check whether the direct remote identification is active and up to date.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.5 Where multi-crew cooperation (MCC) may be required, the UAS operator should:		

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
Multi-crew cooperation (MCC)	Self-declaration	5.5.1 designate a remote pilot-in-command to be responsible for each flight;	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		5.5.2 include procedures to ensure coordination between the remote crew members through robust and effective communication channels; those procedures should cover, as a minimum:	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		5.5.2.1 the assignment of tasks to the remote crew members; and	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		5.5.2.2 the establishment of step-by-step communication; and	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		5.6 ensure that the training of the remote crew covers MCC.	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
Maintenance staff	Declaration supported by data	5.7 Any staff member that is authorised by the UAS operator to perform maintenance activities should have been adequately trained in the documented maintenance procedures.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.' Evidence of training is available at the request of the competent authority.
Personnel in charge of duties essential to the UAS operation are fit to operate		5.8 The personnel in charge of duties essential to the UAS operation should declare that they are fit to operate before conducting any operation, based on the policy that is defined by the UAS operator.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
6. Technical conditions				

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
General	Self-declaration	6.1 The UAS should be equipped with means to monitor the critical parameters of a safe flight, in particular the following:		
		6.1.1 the UA position, height or altitude, ground speed or airspeed, attitude, and trajectory;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.1.2 the UAS energy status (fuel, battery charge, etc.); and	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.1.3 the status of critical functions and systems; as a minimum, for services based on RF signals (e.g. C2 link, GNSS, etc.), means should be provided to monitor the adequate performance and trigger an alert when the performance level becomes too low.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Human-machine interface (HMI)	Self-declaration	6.2 The UAS information and control interfaces should be clearly and succinctly presented and should not confuse, cause unreasonable fatigue, or contribute to causing any disturbance to the personnel in charge of duties essential to the UAS operation in such a way that could adversely affect the safety of the operation.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.3 The UAS operator should conduct a UAS evaluation that considers and addresses human factors to determine whether the HMI is appropriate for the operation.	<i>Please describe how this condition is met.</i>	'I declare compliance.'
C2 links and communication		6.4 The UAS should comply with the applicable requirements for radio equipment and the use of the RF spectrum.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
	Self-declaration	6.5 Protection mechanisms against interference should be used, especially if unlicensed bands (e.g. ISM) are used for the C2 link (mechanisms such as FHSS, DSSS or OFDM technologies, or frequency deconfliction by procedure).	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.6 The UAS should be equipped with a C2 link that is protected against unauthorised access to the command-and-control functions.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.7 In case of loss of the C2 link, the UAS should have a reliable and predictable method to recover the command-and-control link of the UA or to terminate the flight in a way that reduces any undesirable effect on third parties in the air or on the ground.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.8 The UAS operator should ensure that reliable and continuous means of two-way communication for the purpose that is indicated in point 4.1.13(a) above are available.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Tactical mitigation		n/a		
Containment		6.9 To ensure a safe recovery from a technical issue that involves the UAS or an external system that supports the operation, the UAS should comply with the following basic containment provisions:		
		6.9.1 no probable failure of the UAS or of any external system that supports the	<i>Please describe how this condition is met</i>	'n/a since enhanced containment applies.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
	Declaration supported by data	operation would lead to operation outside the operational volume; and		or 'I declare compliance.'
		6.9.2 it is reasonably expected that a fatality will not occur due to any probable failure of the UAS or of any external system that supports the operation. <i>Note: The term 'probable' should be understood in its qualitative interpretation, i.e. 'anticipated to occur one or more times during the entire system/operational life of an item'.</i>	<i>Please describe how this condition is met</i>	'A design and installation appraisal is available and it covers at least: — the design and installation features (independence, separation, and redundancy); and — the particular risks (e.g. hail, ice, snow, electromagnetic interference, etc.) relevant to the type of operation.'
	Declaration supported by data	6.10 The following enhanced containment conditions should apply if the adjacent area includes an assembly of people or if the adjacent airspace is classified as ARC-d (in accordance with SORA):		
		6.10.1 The UAS should be designed to standards that are considered adequate by the competent authority and/or in accordance with a means of compliance that is acceptable to that competent authority such that:	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'n/a since basic containment applies.' or 'I declare compliance with MoC Light-UAS.2511. Analysis and/or test data with supporting evidence is available.'
		6.10.1.1 the probability of the UA leaving the operational volume should be less than 10^{-4} /FH; and	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	or 'The UAS has a DVR demonstrating compliance with the enhanced containment requirements.'
		6.10.1.2 no single failure of the UAS or of any external system that supports the operation should lead to operation outside the ground risk buffer. <i>Note: The term 'failure' should be understood as an occurrence that affects the operation of a</i>	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		component, part, or element in such a way that it can no longer function as intended. Errors may cause failures but are not considered to be failures. Some structural or mechanical failures may be excluded from the criterion if it can be shown that these mechanical parts were designed according to aviation industry best practices.		
		6.10.2 SW and AEH whose development error(s) could directly lead to operations outside the ground risk buffer should be developed according to an industry standard or methodology that is recognised as adequate by EASA. <i>Note 1: The proposed additional safety conditions cover both the integrity and the assurance levels.</i> <i>Note 2: The proposed additional safety conditions do not imply a systematic need to develop the SW and AEH according to an industry standard or methodology that is recognised as adequate by the competent authority. For instance, if the UA design includes an <u>independent</u> engine shutdown function that systematically prevents the UA from exiting the ground risk buffer due to single failures or an SW/AEH error of the flight controls from occurring, the intent of the conditions of point 6.10.1 above could be considered met</i>	Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.	
		6.11 The UAS has a unique serial number compliant with standard ANSI/CTA2063-A-2019, Small Unmanned	Please describe how this condition is met.	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
Remote identification ³	Self-declaration	Aerial Systems Serial Numbers, 2019, according to Article 40(4) of Regulation (EU) 2019/945		
		6.12 The UAS is equipped with a remote identification system according to Article 40(5) of Regulation (EU) 2019/945.	<i>Please describe how this condition is met.</i>	'I declare compliance.'
Lights ⁴	Self-declaration	6.13 If the UAS is operated at night, it is equipped with at least one green flashing light according to point UAS.SPEC.050(1)(l)(i) of the UAS Regulation.	<i>Please describe how this condition is met or indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'

Table PDRA-G02.1 — Main limitations and conditions for PDRA-G02

³ Applicable from 1 July 2022.

⁴ Applicable from 1 July 2022.

AMC4 Article 11 Rules for conducting an operational risk assessment

ED Decision 2023/012/R

PREDEFINED RISK ASSESSMENT PDRA-S01 Version 1.2

EDITION September 2023

(a) Scope

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

This PDRA addresses UAS operations that are conducted:

- (1) with UA with maximum characteristic dimensions (e.g. wingspan, rotor diameter/area or maximum distance between the rotors tips in the case of a multirotor) of up to 3 m;
- (2) in VLOS of the remote pilot;
- (3) over a controlled ground area that might be located in a populated area;
- (4) below 150 m above ground level (AGL) (except when close to obstacles); and
- (5) in controlled or uncontrolled airspace, provided that there is a low probability of encountering manned aircraft¹.

(b) PDRA characterisation and conditions

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

PDRA characterisation and conditions				
Topic	Assurance level	Condition	Demonstration of integrity ²	Demonstration of assurance ³
1. Operational characterisation (scope and limitations)				
Level of human intervention		1.1 No autonomous operations: the remote pilot should have the ability to maintain control of	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

¹ 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) ARC.

² To be filled in by the UAS operator.

³ To be filled in by the UAS operator.

PDRA characterisation and conditions				
Topic	Assurance level	Condition	Demonstration of integrity ¹	Demonstration of assurance ²
	Self-declaration	the UA, except in case of a loss of the command-and control (C2) link.		
		1.2 The remote pilot should operate only one UA at a time.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.3 The remote pilot should not operate the UA from a moving vehicle.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.4 The remote pilot should not hand the control of the UA over to another command unit.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
UA range limit	Self-declaration	1.5 VLOS distance from the remote pilot at all times.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Overflowed areas	Self-declaration	1.6 UAS operations should be conducted over a controlled ground area.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.7 For the operation of a tethered UA, the area should have a radius equal to the tether length plus 5 m, and should be centred on the point of the surface of the Earth where the tether is fixed.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.8 The UA should have a maximum characteristic dimension (e.g. wingspan, rotor diameter/area or maximum distance between rotors' tips in the case of a multirotor) of less than 3 m.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Flight height limit		1.9 The remote pilot should maintain the UA within 120 m (unless making use of the option defined in point 1.12) from the closest point of the surface of the Earth. The measurement of the distances should be adapted according to the geographical characteristics of the terrain, such as plains, hills, and mountains.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Assurance level	Condition	Demonstration of integrity ¹	Demonstration of assurance ²
	Self-declaration	1.10 When flying a UA within a horizontal distance of 50 m from an artificial obstacle that is taller than 105 m, the maximum height of the UAS operation may be increased up to 15 m above the height of the obstacle, at the request of the entity responsible for the obstacle.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.11 When UAS operators intend to operate at a height above 120 m, up to 150 m, they should define a risk buffer according to point 3.8 below.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Airspace	Self-declaration	1.12 The UA should be operated:		
		1.12.1 in uncontrolled airspace, unless different limitations are provided for by the Member States for their UAS geographical zones in areas where the probability of encountering manned aircraft is not low; or	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.12.2 in controlled airspace after coordination and flight authorisation in accordance with the published procedures for the area of operation, to ensure that the probability of encountering manned aircraft is low. <i>Note: Airspace with an air risk that is classified as not higher than ARC-b can be considered having a low probability of encountering manned aircraft.</i>	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Visibility	Self-declaration	1.13 The flight visibility should allow the remote pilot to conduct the entire flight in VLOS.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Others	Self-declaration	1.14 The UA should not be used to carry dangerous goods, except for dropping items in connection with agricultural, horticultural or forestry activities where the carriage of such items does not contravene any other applicable regulations.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions					
Topic	Assurance level	Condition		Demonstration of integrity ¹	Demonstration of assurance ²
		Note: The operator shall comply with applicable national or international regulations on the use of plant protection products, chemicals, dangerous substances, and preparations as appropriate. This includes Directive 2009/128/EC establishing a framework for Community action to achieve the sustainable use of pesticides, if applicable.			
2. Operational risk classification (according to the classification defined in AMC1 to Article 11 of the UAS Regulation)					
Final GRC	3	Final ARC	ARC-b	SAIL	II
3. Operational mitigations					
Operational and adjacent volume (see Figure 2 of AMC1 Article 11)	Self-declaration	3.1	The UAS operator should define the operational volume, ground risk buffer and adjacent volume for the intended operation, including:	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.1.1	the flight geography; and	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.1.2	the contingency volume, with its external limit(s) at least 10 m beyond the limit(s) of the flight geography if the operation is conducted with untethered UA.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.2	To determine the operational volume, the UAS operator should consider the position-keeping capabilities of the UAS in 4D space (latitude, longitude, height, and time).	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.3	In particular, the accuracy of the navigation solution, the flight technical error of the UAS, as well as the flight path definition error (e.g. map error) and latencies should be considered and addressed when determining the operational volume.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions							
Topic	Assurance level	Condition		Demonstration of integrity ¹	Demonstration of assurance ²		
		3.4	The size of adjacent volume should be defined.		<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’	
		3.5	The remote pilot should apply emergency procedures as soon as there is an indication that the UA may exceed the limits of the operational volume, as per point 5.3.9(d) below.		<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’	
		3.6	No persons should be overflown when spraying liquids or dropping substances. Infrastructure or facilities can be overflown on request of the entity responsible for the infrastructure or facility.		<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’	
Ground risk	Self-declaration	3.7	The UAS operator should establish a ground risk buffer to protect third parties on the ground outside the operational volume.		<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’	
		3.8	For the operation of untethered UA, the ground risk buffer should cover a distance beyond the external limit(s) of the contingency area. That distance should be at least as defined below:		<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’	
		Max height AGL ³	Minimum distance for ground risk buffer				
			with MTOM of up to 10 kg	with MTOM greater than 10 kg			
			10 m	5 m			10 m
			30 m	10 m			20 m
		60 m	15 m	30 m			

³ The closest point from the Earth should be considered.

PDRA characterisation and conditions						
Topic	Assurance level	Condition			Demonstration of integrity ¹	Demonstration of assurance ²
		90 m	20 m	45 m		
		120 m	25 m	60 m		
		150 m	30 m	75 m		
		3.9	For the operation of tethered UA, the ground risk buffer is considered in point 1.7 above.			<i>Please include a reference to the relevant chapter/section of the OM.</i>
Air risk	Declaration supported by data	3.10 If the UAS operation is performed above 120 m and up to 150 m, the UAS operator should:				
		3.10.1 establish an air risk buffer to protect third parties in the air outside the operational volume; and			<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate ‘n/a’.</i>	‘I declare compliance and that supporting evidence is included in the OM.’ Justification supporting the reduction of the air risk buffer is documented in [...] or ‘n/a’.
		3.10.2 if the air risk buffer is part of controlled airspace, coordinate the operation with the respective ANSP;			<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate ‘n/a’.</i>	‘I declare compliance and that supporting evidence is included in the OM.’ or n/a’
		3.10.3 develop appropriate procedures to not jeopardise other airspace users.			<i>Please include a reference to the relevant chapter/section of the OM. Please describe how the remote pilots and, if employed, the AOs are able to assess the height of the UA compared to other airspace users³, otherwise indicate ‘n/a’.</i>	‘I declare compliance and that supporting evidence is included in the OM.’ or n/a’

³ The UAS operator should demonstrate that they have sufficient confidence in the accuracy of the information about the height of the UA and the means to advert and avoid other airspace users and obstacles in the vicinity of the UA.

PDRA characterisation and conditions				
Topic	Assurance level	Condition	Demonstration of integrity ¹	Demonstration of assurance ²
	Self-declaration	3.11 The operational volume should be outside any geographical zone corresponding to a flight restriction zone of a protected aerodrome or of any other type, as defined by the responsible authority, unless the UAS operator has been granted appropriate permission.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.12 Prior to the flight, the UAS operator should assess the proximity of the planned operation to manned aircraft activity.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.13 The UAS operator should establish a de-confliction scheme that allows the remote pilot to take efficient decisions in case of incoming traffic.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Observers		3.14 Airspace observers (AOs): n/a UA observers: refer to point 5.3.9(b) below.		
4. UAS operator and UAS operations conditions				
UAS operator and UAS operations		4.1 The UAS operator should:		
		4.1.1 develop an operations manual (OM) (for the template, refer to AMC1 UAS.SPEC.030(3)(e) and to the complementary information in GM1 UAS.SPEC.030(3)(e));	<i>Please describe how this condition is met.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.2 define, and include in the OM, the procedure to determine the operational volume and ground risk buffer for the intended operation, as per points 3.1 to 3.6 above, and the adjacent volume;	<i>Please describe how this condition is met.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.3 develop procedures to ensure that that the operation is conducted safely and the security requirements applicable to the area of operations are complied with during the intended operation;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'

PDRA characterisation and conditions				
Topic	Assurance level	Condition	Demonstration of integrity ¹	Demonstration of assurance ²
	Declaration supported by data	4.1.4 develop measures to protect the UAS against unlawful interference and unauthorised access;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.5 develop procedures to ensure that all operations comply with Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data. In particular, the UAS operator should carry out a data protection impact assessment, when this is required by the data protection national authority of the Member State with regard to the application of Article 35 of that Regulation;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.6 develop guidelines for its remote pilots to plan UAS operations in a manner that minimises nuisance, including noise and other emissions-related nuisance, to people and animals;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.7 ensure the adequacy of the contingency and emergency procedures and prove it through any of the following: (a) dedicated flight tests; or (b) simulations, provided that the representativeness of the simulation means is proven valid for the intended purpose with positive results; or (c) any other means acceptable to the competent authority;	<i>Please describe how this condition is met</i>	'I declare compliance and that evidence is available to the competent authority for review.'

PDRA characterisation and conditions				
Topic	Assurance level	Condition	Demonstration of integrity ¹	Demonstration of assurance ²
		4.1.8 develop an effective emergency response plan (ERP) that is suitable for the intended operation (see GM1 UAS.SPEC.030(3)(e));	<i>Please describe how this condition is met</i>	'I declare compliance and that evidence is available to the competent authority for review.'
		4.1.9 upload updated information into the geo-awareness function, if such system is installed on the UAS, when required by the UAS geographical zone for the intended location of the operation;	<i>Please describe how this condition is met</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.10 ensure that before starting the operation, the controlled ground area is in place, effective, and compliant with the minimum distance that is defined in points 3.1 and 3.5 above and, when required, coordination with the appropriate authorities has been established;	<i>Please describe how this condition is met</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.11 ensure that before starting the operation, all persons that are present in the controlled ground area:		
		(a) have been informed of the risks of the operation;	<i>Please describe how this condition is met</i>	'I declare compliance and that supporting evidence is included in the OM.'
		(b) have been briefed on or trained in, as appropriate, the safety precautions and measures that the UAS operator has established for their protection; and	<i>Please describe how this condition is met</i>	'I declare compliance and that supporting evidence is included in the OM.'
		(c) have explicitly agreed to participate in the operation; and	<i>Please describe how this condition is met</i>	'I declare compliance and that supporting evidence is included in the OM.'

PDRA characterisation and conditions				
Topic	Assurance level	Condition	Demonstration of integrity ¹	Demonstration of assurance ²
		4.1.12 designate for each flight a remote pilot with adequate competency and other personnel in charge of duties essential to the UAS operation if needed;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.13 in case the operation takes place in a controlled airspace, as part of the procedures that are contained in the OM (point 4.1.1 above), include the description of the following: (a) the method and means of communication with the authority or entity responsible for the management of the airspace during the entire period of operation; (b) the member(s) of personnel in charge of duties essential to the UA operation, who are responsible for establishing that communication;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.14 ensure that the UAS operation effectively uses and supports the efficient use of the radio spectrum in order to avoid harmful interference;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.15 keep for a minimum of 3 years and maintain up to date a record of the information on UAS operations, including any unusual technical or operational occurrences and other data as required by the declaration or by the operational authorisation.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that recordkeeping data is available to the competent authority.'
UAS maintenance	Self-declaration	4.2 The UAS operator should:		
		4.2.1 ensure that the UAS maintenance instructions that are defined by the UAS operator are included in the OM and	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Assurance level	Condition	Demonstration of integrity ¹	Demonstration of assurance ²
		cover at least the UAS manufacturer's instructions and requirements when applicable; and		
		4.2.2 ensure that the maintenance staff follow the UAS maintenance instructions when performing maintenance;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		4.2.3 keep for a minimum of 3 years and maintain up to date a record of the maintenance activities conducted on the UAS;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		4.2.4 establish and maintain up to date a list of the maintenance staff employed by the operator to carry out maintenance activities;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		4.2.5 comply with point UAS.SPEC.100 , if the UAS uses certified equipment.	<i>Please include a reference to the relevant chapter/section of the OM or n/a.</i>	'I declare compliance.' or 'n/a'
External services	Self-declaration	4.3 The UAS operator should ensure that the level of performance for any externally provided service that is necessary for the safety of the flight is adequate for the intended operation. The UAS operator should declare that this level of performance is adequately achieved.	<i>Please describe how this condition is met.</i>	'I declare compliance.'
		4.4 The UAS operator should define and allocate the roles and responsibilities between the UAS operator and the external service provider(s), if applicable.		
5. Conditions for the personnel in charge of duties essential to the UAS operation				

PDRA characterisation and conditions				
Topic	Assurance level	Condition	Demonstration of integrity ¹	Demonstration of assurance ²
General		5.1 The UAS operator should keep and maintain up to date a record of all the relevant qualifications and 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 for at least 3 years after those persons have ceased to be employed by the organisation or have changed position within the organisation.	<i>Please describe how this condition is met.</i>	'I declare compliance.' Record-keeping data is available for inspection at the request of the competent authority.
		5.2 The remote pilot should have the authority to cancel or delay any or all flight operations under the following conditions:		
		5.2.1 the safety of persons is jeopardised; or	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.2.2 property on the ground is jeopardised; or	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.2.3 other airspace users are in jeopardy; or	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.2.4 there is a violation of the terms of the operational authorisation.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Remote pilot	Self-declaration	5.3 The remote pilot should:		
		5.3.1 not perform any duties under the influence of psychoactive substances or alcohol, or when they are unfit to perform their tasks due to injury, fatigue, medication, sickness or other causes;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.3.2 be familiar with the manufacturer's instructions provided by the manufacturer of the UAS;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.3.3 ensure that the UA remains clear of clouds;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Assurance level	Condition	Demonstration of integrity ¹	Demonstration of assurance ²
		5.3.4 hold a certificate of remote pilot theoretical knowledge, in accordance with Attachment A to Chapter I of Appendix 1 to the Annex to the UAS Regulation, which is issued by the competent authority or by an entity that is designated by the competent authority of a Member State;	<i>Please describe how this condition is met.</i>	'I declare compliance.' or 'n/a'
		5.3.5 hold an accreditation of completion of a practical-skills training course for this PDRA, in accordance with Attachment A to Chapter I of Appendix 1 to the Annex to the UAS Regulation, which is issued by: (a) an entity that has declared compliance with the requirements of Appendix 3 to the Annex to the UAS Regulation and is recognised by the competent authority of a Member State; or (b) a UAS operator that has been authorised by the competent authority of the Member State of registration to operate according to this PDRA (or declared to the same competent authority, compliance with STS-01) and with the requirements of Appendix 3 to the Annex to the UAS Regulation.	<i>Please describe how this condition is met.</i>	'I declare compliance.' or 'n/a'
		5.3.6 If operations are conducted at a height between 120 and 150 m, the remote pilot should undergo additional theoretical knowledge training in the following topics:		

PDRA characterisation and conditions				
Topic	Assurance level	Condition	Demonstration of integrity ¹	Demonstration of assurance ²
		(a) raising awareness about the air risk and about the existence of other airspace users;	<i>Please describe how this condition is met.</i>	'I declare compliance and that the training syllabus is available for inspection at the request of the competent authority.'
		(b) checking height determination/limitation devices; and	<i>Please describe how this condition is met.</i>	'I declare compliance and that the training syllabus is available for inspection at the request of the competent authority.'
		(c) using applicable procedures in case a manned aircraft is detected.	<i>Please describe how this condition is met.</i>	'I declare compliance and that the training syllabus is available for inspection at the request of the competent authority.'
		5.3.7 As an alternative to holding a certificate of remote pilot theoretical knowledge, according to point 5.3.4, and to holding an accreditation of completion of a practical-skills training course according to point 5.3.5, the operator may propose a dedicated training syllabus to the competent authority;	<i>Please describe how this condition is met.</i>	'I declare compliance and that the training syllabus is available for inspection at the request of the competent authority.' or 'n/a'.
		5.3.8 Before starting the UAS operation, the remote pilot should:		
		(a) verify that the means to terminate the UA flight and the remote identification system are operational;	<i>Please describe how this condition is met.</i>	'I declare compliance.'
		(b) obtain updated information relevant to the intended operation about any geographical zones defined in accordance with Article 15 of the UAS Regulation; and	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		(c) ensure that the UAS is in a safe condition to complete the intended flight safely and, if applicable, check	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Assurance level	Condition	Demonstration of integrity ¹	Demonstration of assurance ²
		whether the direct remote identification is active and up to date.		
		5.3.9 During the flight:		
		(a) keep the UA in VLOS and maintain thorough visual scan of the airspace that surrounds the UA to avoid any risk of collision with manned aircraft; the remote pilot should discontinue the flight if the operation poses a risk to other aircraft, people, animals, environment or property;	<i>Please describe how this condition is met.</i>	'I declare compliance.'
		(b) for the purpose of point (a) above, possibly being assisted by a UA observer ³ ; clear and effective communication should be established between the remote pilot and the UA observer;	<i>Please describe how this condition is met.</i>	'I declare compliance.'
		(c) use the contingency procedures that are defined by the UAS operator for abnormal situations, including situations where the remote pilot has an indication that the UA may exceed the limits of the flight geography; and	<i>Please describe how this condition is met.</i>	'I declare compliance.'
		(d) use the emergency procedures that are defined by the UAS operator for emergencies, including triggering the means to terminate the flight when the remote pilot has an indication that the UA may exceed the limits of the	<i>Please describe how this condition is met.</i>	'I declare compliance.'

³ Please refer to point [UAS.STS-02.050](#) for the responsibilities of the UA observer.

PDRA characterisation and conditions				
Topic	Assurance level	Condition	Demonstration of integrity ¹	Demonstration of assurance ²
		operational volume; the means to terminate the flight should be triggered at least 10 m before the UA reaches the limits of the operational volume;		
		(e) keep the UA at a ground speed of less than 5 m/s in case of untethered UA;	<i>Please describe how this condition is met.</i>	'I declare compliance.'
		(f) activate the direct remote identification system ³ .	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
6. Technical conditions				
UAS	Self-declaration ⁴	6.1 The UAS operator should use a UAS marked as class C5 and complies with the requirements of that class, as defined in Part 16 of the Annex to Regulation (EU) 2019/945 .		'I declare that the UAS is marked with a class C5 identification label.' or 'n/a'
		6.2 As an alternative to point 6.1, the UAS operator may use a UAS that complies with the requirements of Part 16 of the Annex to Regulation (EU) 2019/945 , except that the UAS does <u>not</u> need to: • bear a class C3 UAS or a class C5 UAS identification label; • have an MTOM of less than 25 kg; • be exclusively powered by electricity, if the UAS operator ensures that the environmental impact that is caused by the use of non-electric UAS is minimised;	<i>Please describe how this condition is met.</i>	'I declare compliance.' or 'n/a'

³ Applicable from 1 July 2022.

⁴ The containment requirements (reference to point 5 of [Part 16](#) of [Regulation \(EU\) 2019/945](#)) should be demonstrated with a medium assurance level.

PDRA characterisation and conditions				
Topic	Assurance level	Condition	Demonstration of integrity ¹	Demonstration of assurance ²
		- include an information notice that is published by EASA and provides the applicable limitations and obligations, as required by the UAS Regulation; and - include the manufacturer's instructions for the UAS, if it is privately built; however, information on its operation and maintenance, as well as on the training of the remote pilot, should be included in the OM. Note 1: The UAS can comply with point (9) of Part 4 of the Annex to Regulation (EU) 2019/945 by using an add-on that complies with Part 6 of the Annex to that Regulation. Note 2: If the UA does not bear a physical serial number that is compliant with standard ANSI/CTA 2063-A 'Small Unmanned Aerial Systems Serial Numbers' and/or does not have an integrated system of direct remote identification, it can comply with point (9) of Part 4 of the Annex to Regulation (EU) 2019/945 by using an add-on that complies with Part 6 of the Annex to that Regulation.		
		6.3 In addition, if: - the adjacent area does not include a populated area or an assembly of people; and - the adjacent airspace is classified as ARC-a or ARC-b,		

Please describe how this condition is met.

'Basic containment applies and I declare that a design and installation appraisal is available and it covers at least:

- the design and installation features (independence separation, and redundancy); and
- the particular risks (e.g. hail, ice, snow, electromagnetic

PDRA characterisation and conditions				
Topic	Assurance level	Condition	Demonstration of integrity ¹	Demonstration of assurance ²
		point 5 of Part 16 of the Annex to Regulation (EU) 2019/945 may be replaced with the following basic containment conditions: - no probable failure of the UAS or of any external system that supports the operation would lead to operation outside the operational volume; and - it is reasonably expected that a fatality will not occur due to any probable failure of the UAS or of any external system that supports the operation.		interference, etc.) relevant to the type of operation.’ or ‘Enhanced containment applies and I declare compliance with MoC Light-UAS.2511. Analysis and/or test data with supporting evidence is available.’ or ‘The UAS has a DVR demonstrating compliance with the enhanced containment requirements.’
		6.4 If designed to spray, the UA should:		
		6.4.1 be designed to avoid an accidental release of any substance;		
		6.4.2 have means for the remote pilot to immediately stop the spraying of liquids or dropping of substances in case of an emergency.		

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

AMC5 Article 11 Rules for conducting an operational risk assessment

ED Decision 2022/002/R

PREDEFINED RISK ASSESSMENT PDRA-S02 Version 1.1

EDITION January 2022

(a) Scope

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

This PDRA addresses UAS operations that are conducted:

- (1) with UA with maximum characteristic dimensions (e.g. wingspan, rotor diameter/area or maximum distance between rotors in case of a multicopter) of up to 3 m and MTOM of up to 25 kg;
- (2) at a distance of up to 2 km from the remote pilot if airspace observers (AOs) are employed; otherwise at a distance of up to 1 km;
- (3) over a controlled ground area that is entirely located in a sparsely populated area;
- (4) below 150 m above ground level (AGL) (except when close to obstacles); and
- (5) in controlled or uncontrolled airspace, provided that there is a low probability of encountering manned aircraft¹.

(b) PDRA characterisation and conditions

The characterisation and conditions for this PDRA are summarised in Table PDRA-S02.1 below:PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ²	Proof ³
1. Operational characterisation (scope and limitations)				
Level of human intervention		1.1 No autonomous operations: the remote pilot should maintain control of the UA, except in case of a loss of the command-and-control (C2) link.	Please include a reference to the relevant chapter/section of the OM.	'I declare compliance.'

¹ Member States are required to establish the appropriate measures (e.g. UAS geographical zones) to ensure this low probability of encounter. Such 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) ARC.

² To be filled in by the UAS operator.

³ To be filled in by the UAS operator.

The characterisation and conditions for this PDRA are summarised in Table PDRA-S02.1 below:PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
	Self-declaration	1.2 The remote pilot should operate only one UA at a time.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.3 The remote pilot should not operate the UA from a moving vehicle.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.4 The remote pilot should not hand the control of the UA over to another command unit.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
UA range limit	Self-declaration	1.5 UAS operations should be conducted:		
		1.5.1 keeping the UA in sight of the remote pilot during the launch and recovery of the UA, unless the recovery of the UA is the result of an emergency flight termination;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.5.2 if no airspace observer (AO) is employed in the operation, with the UA no further than 1 km from the remote pilot; and	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.5.3 if one or more AOs are employed in the operation, with the UA no further than 2 km from the remote pilot.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Overflown areas	Self-declaration	1.6 UAS operations should be conducted over a controlled ground area.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
UA limitations	Self-declaration	1.7 The UA should have an MTOM of less than 25 kg, including payload.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.8 The UA should have maximum characteristic dimensions (e.g. wingspan, rotor diameter/area or maximum distance between rotors in case of a multicopter) of less than 3 m.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.9 The UA should have a maximum ground speed in level flight of not more than 50 m/s.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Flight height limit		1.10 The remote pilot should maintain the UA within 120 m (unless making use of the option defined in point 1.12) from the closest point of the surface of the Earth. The measurement of the distances should be adapted according to the	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

The characterisation and conditions for this PDRA are summarised in Table PDRA-S02.1 below:PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
	Self-declaration	geographical characteristics of the terrain, such as plains, hills, and mountains.		
		1.11 When flying a UA within a horizontal distance of 50 m from an artificial obstacle that is taller than 105 m, the maximum height of the UAS operation may be increased up to 15 m above the height of the obstacle at the request of the entity that is responsible for the obstacle.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.12 The UAS operator may propose to operate at a height above 120 m, but up to 150 m. In that case, the UAS operator should define a risk buffer according to point 3.7 below.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Airspace		1.13 The UA should be operated:		
		1.13.1 in uncontrolled airspace, unless different limitations are provided for by the Member States for their UAS geographical zones in areas where the probability of encountering manned aircraft is not low; or	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.13.2 in controlled airspace after coordination and flight authorisation in accordance with the published procedures for the area of operation, to ensure that the probability of encountering manned aircraft is low. <i>Note: Airspace with an air risk that is classified as not higher than ARC-b can be considered having a low probability of encountering manned aircraft.</i>	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Visibility	Self-declaration	1.14 The UA operation should be conducted in an area where the flight visibility is greater than 5 km. <i>Note: Please refer to GM1 UAS.STS-02.020(3).</i>	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Others	Low	1.15 The UA should not be used to carry dangerous goods, except for dropping items in connection with agricultural, horticultural or forestry	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

The characterisation and conditions for this PDRA are summarised in Table PDRA-S02.1 below:PDRA characterisation and conditions					
Topic	Method of proof	Condition		Integrity ¹	Proof ²
		activities where the carriage of such items does not contravene any other applicable regulations.			
2. Operational risk classification (according to the classification defined in AMC1 to Article 11 of the UAS Regulation)					
Final GRC	3	Final ARC	ARC-b	SAIL	II
3. Operational mitigations					
Operational volume (see Figure 2 of AMC1 Article 11)	Self-declaration	3.1	The UAS operator should define the operational volume for the intended operation, including the flight geography and the contingency volume.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’
		3.2	To determine the operational volume, the UAS operator should consider the position-keeping capabilities of the UAS in 4D space (latitude, longitude, height, and time).	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’
		3.3	In particular, the accuracy of the navigation solution, the flight technical error of the UAS, as well as the flight path definition error (e.g. map error) and latencies should be considered and addressed when determining the operational volume.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’
		3.4	The remote pilot should apply emergency procedures as soon as there is an indication that the UA may exceed the limits of the operational volume, as per point 5.3.10(h) below.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’
Ground risk	Self-declaration	3.5	The UAS operator should establish a ground risk buffer to protect third parties on the ground outside the operational volume.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’
		3.6	The ground risk buffer should cover a distance that is at least equal to the distance most likely to be travelled by the UA after activation of the flight termination system specified by the UAS manufacturer’s instructions, considering the	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’

The characterisation and conditions for this PDRA are summarised in Table PDRA-S02.1 below:PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		operational conditions within the limitations specified by the UAS manufacturer.		
Air risk	Declaration supported by data	3.7 If the UAS operation is performed above 120 m and up to 150 m, the UAS operator should:		
		3.7.1 establish an air risk buffer to protect third parties in the air outside the operational volume; and	<i>Please include a reference to the relevant chapter/section of the OM, or otherwise indicate 'n/a'.</i>	'I declare compliance.' Justification supporting the reduction of the air risk buffer is documented in [...]. or 'n/a'
		3.7.2 if the air risk buffer is part of controlled airspace, coordinate the operations with the respective ANSP.	<i>Please include a reference to the relevant chapter/section of the OM, or otherwise indicate 'n/a'.</i>	'I declare compliance and that supporting evidence is included in the OM.' [...]. or 'n/a'
		3.7.3 develop appropriate procedures to not jeopardise other airspace users.	<i>Please include a reference to the relevant chapter/section of the OM. Please describe how the remote pilots and, if employed, the AOs are able to assess the height of the UA compared to other airspace users³, or otherwise indicate 'n/a'.</i>	'I declare compliance and that supporting evidence is included in the OM.' [...]. or 'n/a'
	Self-declaration	3.8 The operational volume should be outside any geographical zone corresponding to a flight restriction zone of a protected aerodrome or of any other type, as defined by the responsible authority, unless the UAS operator has been granted appropriate permission.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.
		3.9 Prior to the flight, the UAS operator should assess the proximity of the planned operation to manned aircraft activity.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.

³ The UAS operator should demonstrate that they have sufficient confidence in the accuracy of the information about the height of the UA and the means to advert and avoid other airspace users and obstacles in the vicinity of the UA.

The characterisation and conditions for this PDRA are summarised in Table PDRA-S02.1 below:PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
Observers ³	Self-declaration	3.10 If the UAS operator decides to employ one or more airspace observers (AOs), the UA may be operated at a distance from the remote pilot greater than that referred to in point 1.5.2 above.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.
		3.11 In relation to AOs, the UAS operator should comply with the conditions of point 4.1.15 below.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.
		3.12. AOs should comply with the conditions of point 5.4 below.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.
UAS operator and UAS operations conditions				
UAS operator and UAS operations	Declaration supported by data	4.1 The UAS operator should:		
		4.1.1 develop an operations manual (OM) (for the template, refer to AMC1 UAS.SPEC.030(3)(e) and to the complementary information in GM1 UAS.SPEC.030(3)(e));	<i>Please describe how this condition is met.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.2 define the operational volume and ground risk buffer for the intended operation, as per points 3.1 to 3.6 above, and include them in the OM;	<i>Please describe how this condition is met.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.3 develop procedures to ensure that the security requirements applicable to the area of operations are complied with during the intended operation;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.4 develop measures to protect the UAS against unlawful interference and unauthorised access;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.5 develop procedures to ensure that all operations comply with Regulation (EU) 2016/679 on the protection of natural	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'

³ Please refer to point [UAS.STS-02.050](#) for the AO's main responsibilities.

The characterisation and conditions for this PDRA are summarised in Table PDRA-S02.1 below:PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		persons with regard to the processing of personal data and on the free movement of such data. In particular, the UAS operator should carry out a data protection impact assessment, when this is required by the data protection national authority of the Member State with regard to the application of Article 35 of that Regulation;		
		4.1.6 develop guidelines for its remote pilots to plan UAS operations in a manner that minimises nuisance, including noise and other emissions-related nuisance, to people and animals;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.7 ensure the adequacy of the contingency and emergency procedures and prove it through any of the following: (a) dedicated flight tests; or (b) simulations, provided that the representativeness of the simulation means is proven for the intended purpose with positive results; or (c) any other means acceptable to the competent authority;	<i>Please describe how this condition is met.</i>	'I declare compliance and evidence is available to the competent authority for review.'
		4.1.8 develop an emergency response plan (ERP) that is suitable for the intended operation in accordance with the conditions for a 'medium' level of robustness (please refer to AMC3 UAS.SPEC.030(3)(e));	<i>Please describe how this condition is met</i>	'I declare compliance and that the ERP is available to the competent authority for review.'
		4.1.9 upload updated information into the geo-awareness function, if such system is installed on the UAS, when required by the UAS geographical zone for the intended location of the operation;	<i>Please describe how this condition is met</i>	'I declare compliance and that supporting evidence is included in the OM.'

The characterisation and conditions for this PDRA are summarised in Table PDRA-S02.1 below:PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		4.1.10 ensure that before starting the operation, the controlled ground area is in place, effective, and compliant with the minimum distance that is defined in points 3.1 and 3.6 above and, when required, coordinate with the appropriate authorities;	<i>Please describe how this condition is met</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.11 ensure that before starting the operation, all persons that are present in the controlled ground area:		
		(a) have been informed of the risks of the operation;	<i>Please describe how this condition is met.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		(b) have been briefed on or trained in, as appropriate, the safety precautions and measures that the UAS operator has established for their protection; and	<i>Please describe how this condition is met.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		(c) have explicitly agreed to participate in the operation;	<i>Please describe how this condition is met.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.12 designate for each flight a remote pilot with adequate competency and other personnel in charge of duties essential to the UAS operation if needed;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.13 ensure that the UAS operation effectively uses and supports the efficient use of the radio spectrum in order to avoid harmful interference;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.14 keep for a minimum of 3 years and maintain up to date a record of the information on UAS operations, including any unusual technical or operational occurrences and other data as required by the declaration or by the operational authorisation;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that record-keeping data is available to the competent authority.'

The characterisation and conditions for this PDRA are summarised in Table PDRA-S02.1 below:PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		4.1.15 before starting the operation, and if airspace observers (AOs) are employed:		
		(a) ensure the correct placement and the appropriate number of AOs along the intended flight path;	<i>Please describe how this condition is met</i>	'I declare compliance and that supporting evidence is included in the OM.'
		(b) verify that:		
		(i) the visibility and the planned distance of the AOs are within the acceptable limits as defined in the OM;	<i>Please describe how this condition is met</i>	'I declare compliance and that supporting evidence is included in the OM.'
		(ii) there are no potential terrain obstructions for each AO;	<i>Please describe how this condition is met</i>	'I declare compliance and that supporting evidence is included in the OM.'
		(iii) there are no gaps between the zones that are covered by each of the AOs;	<i>Please describe how this condition is met</i>	'I declare compliance and that supporting evidence is included in the OM.'
		(iv) the communication with each AO is established and effective;	<i>Please describe how this condition is met</i>	'I declare compliance and that supporting evidence is included in the OM.'
		(v) if means are used by the AOs to determine the position of the UA, those means are functioning and effective; and	<i>Please describe how this condition is met</i>	'I declare compliance and that supporting evidence is included in the OM.'
		(c) ensure that the AOs have been briefed on the planned flight path of the UA and on the associated timing.	<i>Please describe how this condition is met</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.2 If no AO is employed in the operation, the operation should be conducted with the UA flying no further from the remote pilot than the distance that is indicated in point 1.5.2 above and following a preprogrammed trajectory when the UA is not in the VLOS of the remote pilot	<i>Please describe how this condition is met.</i>	'I declare compliance and that supporting evidence is included in the OM.'

The characterisation and conditions for this PDRA are summarised in Table PDRA-S02.1 below:PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		4.3 If one or more AOs are employed in the operation, the following conditions should be complied with:		
		4.3.1 the AO(s) should be positioned so as to adequately cover the operational volume and the surrounding airspace, having the minimum flight visibility that is indicated in point 1.14 above;	Please describe how this condition is met.	'I declare compliance and that supporting evidence is included in the OM.'
		4.3.2 the UA should be operated no further than 1 km from the AO who is nearest to the UA;	Please describe how this condition is met.	'I declare compliance and that supporting evidence is included in the OM.'
		4.3.3 the distance between any AO and the remote pilot should not be greater than 1 km; and	Please describe how this condition is met.	'I declare compliance and that supporting evidence is included in the OM.'
		4.3.4 robust and effective means are available for communication between the remote pilot and the AO(s).	<i>Please describe how this condition is met.</i>	'I declare compliance and that supporting evidence is included in the OM.'
UAS maintenance	Self-declaration	4.4. The UAS operator should:		
		4.4.1 ensure that the UAS maintenance instructions that are defined by the UAS operator are included in the OM and cover at least the UAS manufacturer's instructions and requirements when applicable; and	<i>Please describe how this condition is met.</i>	'I declare compliance.'
		4.4.2 that maintenance staff follow the UAS maintenance instructions when performing maintenance;	<i>Please describe how this condition is met.</i>	'I declare compliance.'
		4.4.3 keep for a minimum of 3 years and maintain up to date a record of the maintenance activities conducted on the UAS;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		4.4.4 establish and maintain up to date a list of the maintenance staff employed by the operator to carry out maintenance activities;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

The characterisation and conditions for this PDRA are summarised in Table PDRA-S02.1 below:PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		4.4.5 comply with point UAS.SPEC.100 , if the UAS uses certified equipment.	<i>Please include a reference to the relevant chapter/section of the OM or indicate 'n/a'</i>	'I declare compliance.' or 'n/a'
External services	Self-declaration	4.5 The UAS operator should ensure that the level of performance for any externally provided service that is necessary for the safety of the flight is adequate for the intended operation. The UAS operator should declare that this level of performance is adequately achieved.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		4.6 The UAS operator should define and allocate the roles and responsibilities between the UAS operator and the external service provider(s), if applicable.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
5. Conditions for the personnel in charge of duties essential to the UAS operation				
General		5.1 The UAS operator should keep and maintain up to date a record of all the relevant qualifications and training courses completed by the remote pilot and other personnel in charge of duties essential to the UAS operation and by the maintenance staff for at least 3 years after those persons have ceased to be employed by the organisation or have changed position within the organisation.	<i>Please describe how this condition is met</i>	'I declare compliance.' Record-keeping data is available for inspection at the request of the competent authority.
		5.2 The remote pilot should have the authority to cancel or delay any or all flight operations under the following conditions:		
		5.2.1 the safety of persons is jeopardised; or	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.2.2 property on the ground is jeopardised; or	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.2.3 other airspace users are in jeopardy; or	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

The characterisation and conditions for this PDRA are summarised in Table PDRA-S02.1 below:PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		5.2.4 there is a violation of the terms of the operational authorisation.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Remote pilot	Self-declaration	5.3 The remote pilot should:		
		5.3.1 not perform any duties under the influence of psychoactive substances or alcohol, or when they are unfit to perform their tasks due to injury, fatigue, medication, sickness or other causes;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.3.2 be familiar with the manufacturer's instructions provided by the manufacturer of the UAS;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.3.3 ensure that the UA remains clear of clouds; and	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.3.4 hold a certificate of remote pilot theoretical knowledge, in accordance with Attachment A to Chapter II of Appendix 1 to the Annex to the UAS Regulation, which is issued by the competent authority or by an entity that is designated by the competent authority of a Member State;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.3.5 hold an accreditation of completion of a practical-skills training course for this PDRA, in accordance with Attachment A to Chapter I of Appendix 1 to the Annex to the UAS Regulation, which is issued by: (a) an entity that has declared compliance with the requirements of Appendix 3 to the Annex to the UAS Regulation and is recognised by the competent authority of a Member State; or (b) a UAS operator that has been authorised by the competent authority of the Member State of registration to operate	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

The characterisation and conditions for this PDRA are summarised in Table PDRA-S02.1 below:PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		according to this PDRA (or declared to the same competent authority compliance with STS-01) and with the requirements of Appendix 3 to the Annex to the UAS Regulation;		
		5.3.6 if operations are conducted at a height between 120 and 150 m, receive additional theoretical knowledge training in the following topics:		
		(a) raising awareness about the air risk and about the existence of other airspace users;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		(b) checking height determination/limitation devices;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		(c) using procedures for the coordination between the remote pilot and the AO(s);	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		(d) using the applicable procedures in case a manned aircraft is detected;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.3.7 obtain updated information relevant to the intended operation about any geographical zones defined in accordance with Article 15 of the UAS Regulation; and	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.3.8 ensure that the UAS is in a safe condition to complete the intended flight safely and, if applicable, check whether the direct remote identification is active and up to date;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.3.9 before starting the UAS operation:		
		(a) verify that the remote identification system is operational;	<i>Please describe how this condition is met</i>	'I declare compliance.'
		(b) obtain updated information relevant to the intended operation about any geographical zones defined in	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

The characterisation and conditions for this PDRA are summarised in Table PDRA-S02.1 below:PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		accordance with Article 15 of the UAS Regulation;		
		(c) ensure that the UAS is in a safe condition to complete the intended flight safely and, if applicable, check whether the direct remote identification is active and up to date;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		(d) set the programmable flight volume of the UA to keep it within the flight geography; and	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		(e) verify that the means to terminate the flight as well as the programmable flight volume functionality of the UA are operational; and	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.3.10 during the flight:		
		(a) unless supported by aerial observers (AOs), maintain thorough visual scan of the airspace that surrounds the UA to avoid any risk of collision with manned aircraft; the remote pilot should discontinue the flight if the operation poses a risk to other aircraft, people, animals, environment or property;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		(b) maintain control of the UA, except in case of a loss of the command-and-control link;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		(c) operate only one UA at a time;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		(d) not operate the UA from a moving vehicle;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		(e) not hand the control of the UA over to another control unit;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

The characterisation and conditions for this PDRA are summarised in Table PDRA-S02.1 below:PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		(f) inform the AO(s), when employed, in a timely manner of any deviations of the UA from the intended flight path, and of the associated timing;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		(g) use the contingency procedures that are defined by the UAS operator for abnormal situations, including situations where the remote pilot has an indication that the UA may exceed the limits of the flight geography;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		(h) use the emergency procedures that are defined by the UAS operator for emergencies, including triggering the means to terminate the flight when the remote pilot has an indication that the UA may exceed the limits of the operational volume;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		(i) activate the system to prevent the UA from exceeding the limits of the flight geography; and	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		(j) activate the direct remote identification system ³ .	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Airspace observer (AO)		5.4 The AO's main responsibilities are laid down in point UAS-STS-02.050 of the Annex to the UAS Regulation.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.5 If operations are conducted at a height between 120 and 150 m, the AO(s) should undergo additional theoretical knowledge training in the following topics:		

³ Applicable from 1 July 2022.

The characterisation and conditions for this PDRA are summarised in Table PDRA-S02.1 below:PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
	Self-declaration	(a) raising awareness about the air risk and about the existence of other airspace users;	<i>Please include a reference to the relevant chapter/section of the OM, or otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		(b) checking height determination/ limitation devices;	<i>Please include a reference to the relevant chapter/section of the OM, or otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		(c) using the procedures for the coordination between the remote pilot and the AO(s); and	<i>Please include a reference to the relevant chapter/section of the OM, or otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		(d) using the applicable procedures in case a manned aircraft is detected.	<i>Please include a reference to the relevant chapter/section of the OM, or otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
6. Technical conditions				
UAS	Self-declaration ³	6.1 The UAS operator should use a UAS marked with a class C6 identification label and which complies with the requirements of that class, as defined in Part 17 of the Annex to Regulation (EU) 2019/945.		'I declare that the UAS is marked with a class C6 identification label.' or 'n/a'
		6.2 As an alternative to point 6.1, the UAS operator may use a UAS that complies with the requirements of Part 16 of the Annex to Regulation (EU) 2019/945, except that the UAS does not need to:	<i>Please describe how this condition is met.</i>	'I declare compliance.' or 'n/a'
		6.2.1 bear a class C3 or a class C6 UAS identification label;		
		6.2.2 be exclusively powered by electricity, if the UAS operator ensures that the environmental impact that is caused by the use of non-electric UAS is minimised;		

³ The containment requirements (reference to points 4 and 5 of [Part 17](#) of Regulation (EU) 2019/945) should be demonstrated with a 'medium' assurance level.

The characterisation and conditions for this PDRA are summarised in Table PDRA-S02.1 below:PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		6.2.3 include a notice that is published by EASA and provides the applicable limitations and obligations, as required by the UAS Regulation; and		
		6.2.4 include the manufacturer's instructions for the UAS if it is privately built; however, information on its operation and maintenance, as well as on the training of the remote pilot, should be included in the OM. Note 1: The UAS can comply with point (9) of Part 4 of the Annex to Regulation (EU) 2019/945 by using an add-on that complies with Part 6 of the Annex to that Regulation. Note 2: If the UA does not bear a physical serial number that is compliant with standard ANSI/CTA-2063-A 'Small Unmanned Aerial Systems Serial Numbers' and/or does not have an integrated system of direct remote identification, it can comply with point (9) of Part 4 of the Annex to Regulation by using an add-on that complies with Part 6 of the Annex to that Regulation. Note 3: If the UAS is privately built, there may be no identification on the UA of its MTOM. In that case, the operator should ensure that the MTOM of the UA, in the configuration of the UA before take-off, does not exceed 25 kg.		

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

AMC6 Article 11 Rules for conducting an operational risk assessment

ED Decision 2023/012/R

PREDEFINED RISK ASSESSMENT PDRA-G03 Version 1.1

EDITION September 2023

(a) Scope

This PDRA is the result of applying the methodology described in [AMC1 Article 11](#) of the UAS Regulation to UAS operations performed in the ‘specific’ category:

- (1) with UA with maximum characteristic dimensions (e.g. wingspan, rotor diameter/area or maximum distance between rotors in case of a multicopter) of up to 3 m and typical kinetic energies of up to 34 kJ;
- (2) BVLOS of the remote pilot;
- (3) over sparsely populated areas;
- (4) within the range of the direct C2 link in an operational volume under 30 m above the overflowed area (or any other altitude reference defined by the Member State of operations);
- (5) following preprogrammed or preplanned flexible routes within the operational volume;
- (6) in one of the following conditions:
 - (i) reserved or segregated airspace for UAS operations;
 - (ii) operating at a maximum height not exceeding 30 m from the ground;
 - (iii) when operating at no more than 30 m horizontally from an obstacle, operating at a maximum height not exceeding 15 m from the obstacle; if the height of the obstacle does not exceed 20 m, then the height of the operation may be up to 30 m from the obstacle (meaning no more than a total of 50 m from the ground);

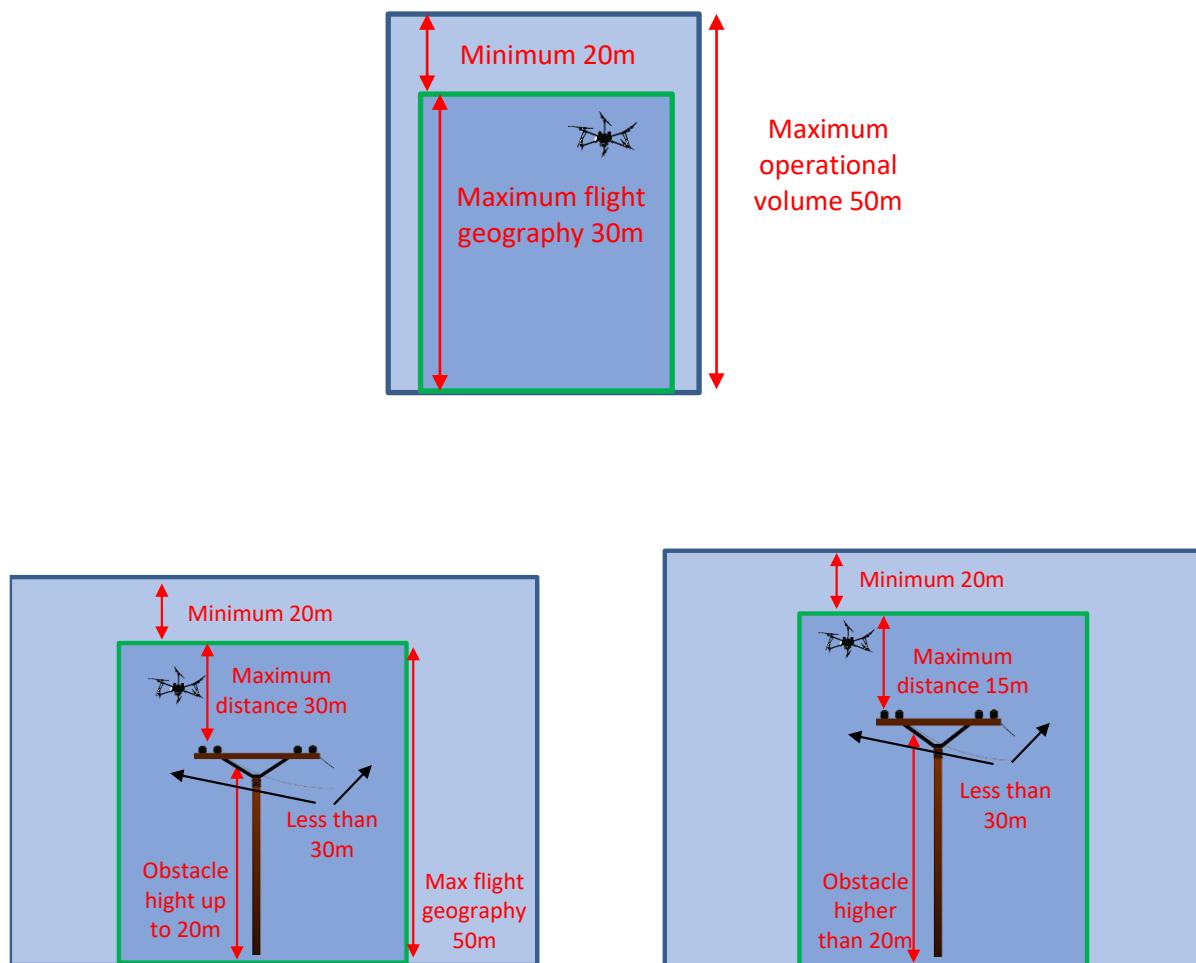


Figure 1 — Flight geography and operational volume when the operation is not conducted in reserved or segregated area

- (7) operated routinely for regular inspections of facilities and infrastructure, e.g. industrial plants and similar, and operating in the atypical airspace within the shielding of such artificial obstacles as well as the natural obstacles, if any. The area of operation should be clearly identified within the application and the competent authority should issue a ‘precise’ operation authorisation according to [GM1 UAS.SPEC.040\(1\)](#).

Note 1: This PDRA has been tailored for routine automated surveillance operation and inspection of facilities and infrastructures. It may be used as a basis for other purposes and, thus, may require an additional risk assessment.

Note 2: Many UAS operations under this PDRA may be conducted with a high level of automation, which should be considered by the competent authorities in terms of the required level of practical-skills training and assessment, as it should be proportionate to the lower level of intervention required by the remote pilot.

(b) PDRA characterisation and conditions

The characterisation and conditions for this PDRA are summarised in Table PDRA-G03.1 below:

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
1. Operational characterisation (scope and limitations)				
Level of human intervention	Self-declaration	1.1 No autonomous operations: the remote pilot should have the ability to maintain control of the UA, except in case of a loss of the command-and-control (C2) link.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’
		1.2 The remote pilot should always be able to terminate the flight.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’
		1.3 Either the flight path should be preprogrammed or flexible routes should be preplanned to ensure the UA avoids obstacles in the operational volume.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’
		1.4 The remote pilot should not hand the control of the UA over to another command unit.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’
		1.5 The remote pilot should not operate the UA from a moving vehicle.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’

¹ To be filled in by the UAS operator.

² To be filled in by the UAS operator.

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
UA range limit	Self-declaration	1.6 The remote pilot should not hand the control of the UA over to another command unit.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.7 <u>Launch/recovery</u> : at VLOS distance from the remote pilot, if not operating from a safe prepared area. <i>Note: 'Safe prepared area' means a controlled ground area that is suitable for the safe launch/recovery of the UA.</i>	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.8 In flight: The range limit should be within the C2 link direct coverage which ensures the safe conduct of the flight.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Overflown areas	Declaration supported by data	1.9 UAS operations should be conducted:		
		1.9.1 over sparsely populated areas, and	<i>Please include a reference to the relevant chapter/section of the OM where the procedures for determining the population density are provided.</i>	'I declare compliance.' <i>Please describe how the population density data is identified.</i>
		1.9.2 over or up to 15 m horizontal distance from a facility or infrastructure at the request of the person or entity that is responsible for that facility or infrastructure.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
UA limitations	Self-declaration	1.10 Maximum characteristic dimensions (e.g. wingspan, rotor diameter/area or maximum distance between rotors in the case of a multirotor): up to 3 m	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		1.11 Typical kinetic energy: up to 34 kJ	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Flight height limit	Self-declaration	1.12 The maximum height of the operational volume should not be greater than the size of the reserved or segregated airspace, if applicable, or the height defined according to para 3.9. <i>Note: See point 3.10 defining the air risk buffer to be considered</i>	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions					
Topic	Method of proof	Condition	Integrity ¹	Proof ²	
Airspace	Self-declaration	1.13 The UA should be operated: <i>(refer also to point 3.9)</i>			
		1.13.1 in ‘atypical airspace’ that is included in uncontrolled airspace;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’	
		1.13.2 in controlled airspace which the competent authority has defined it meets ‘atypical airspace’ requirements and with the relevant coordination as defined by competent authority; or	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’	
Visibility	Self-declaration	1.14 If take-off and landing are conducted in VLOS of the remote pilot, the visibility should be sufficient to ensure that no people are in danger during the take-off /landing phase. The remote pilot should abort the take-off or landing in case people on the ground are in danger.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’	
Others	Self-declaration	1.15 The UA should not be used to drop material or to carry dangerous goods, except for dropping items in connection with agricultural, horticultural or forestry activities where the carriage of such items does not contravene any applicable regulations.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’	
2. Operational risk classification (according to the classification defined in AMC1 to Article 11 of the UAS Regulation)					
Final GRC	3	Final ARC	ARC-a	SAIL	II
3. Operational mitigations					
Operational volume (see Figure 2 of AMC1 Article 11)	Self-declaration	3.1 To determine the operational volume, the UAS operator should consider the position-keeping capabilities of the UAS in 4D space (latitude, longitude, height, and time).	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’	
		3.2 In particular, the accuracy of the navigation solution, the flight technical error of the UAS and the path definition error (e.g. map error) and latencies should be considered and	<i>Please include a reference to the relevant chapter/section of the OM.</i>	‘I declare compliance.’	

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
Ground risk	Self-declaration	addressed when determining the operational volume.		
		3.3 The remote pilot should apply the emergency procedures as soon as there is an indication that the UA may exceed the limits of the operational volume.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.4 The UAS operator should establish a ground risk buffer to protect third parties on the ground outside the operational volume.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.4.1 The default criterion should be the use of the '1:1 rule' (e.g. if the UA is planned to operate at a height of 25 m, the ground risk buffer should at least be 25 m).	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.4.2 A smaller ground risk buffer value may be applied by the applicant for a rotary wing UA using a ballistic methodology approach acceptable to the competent authority. The 1:1 rule may in certain cases not be sufficient to meet the target level of safety. In such a case, the competent authority may ask for a refinement of the definition of the ground risk buffer, based on criteria defined in SORA Step #9 depending on the adjacent air and ground risks.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.5 The operational volume and the ground risk buffer should be all contained in a sparsely populated area.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.6 The UAS operator should evaluate the area of operations, typically by means of on-site inspection or appraisal, and should be able to justify the significantly lower density of people at risk than in sparsely populated areas within	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		the entire operational volume including the ground risk buffer.		
		3.7 The UAS operator should ensure that the person or entity responsible for the facility or infrastructure has taken the necessary measures to protect the uninvolved persons present within the limits of the facility or infrastructure during the UAS operation.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.8 The UAS operator should include points 3.4 to 3.7 in the Operations Manual (OM) (see point 4.1.1) and declare compliance with those conditions.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Air risk	Self-declaration	3.9 The UAS operation should be conducted: 3.9.1 in 'atypical airspace' which, for the purpose of this PDRA, is one of the following: 3.9.1.1 in reserved or segregated airspace; the claim for ARC-a is met if a reserved or segregated airspace is established and approved for the purpose of conducting UAS operations under this PDRA, with the operational volume and air risk buffer, if applicable, being entirely contained in that reserved or segregated airspace; 3.9.1.2 at a height of the flight geography of less than 30 m; 3.9.1.3 when operating in the proximity of natural or artificial obstacles (e.g. trees, buildings, towers, cranes, fences, power lines, etc.) whose height is below 20 m, keeping the UA within the following distances:	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		(i) 30 m horizontal distance; (ii) 30 m vertical distance from the top of the overflowed obstacle; 3.9.1.4 when operating in the proximity of natural or artificial obstacles (e.g. trees, buildings, towers, cranes, fences, power lines, etc.) whose height is above 20 m, keeping the UA within the following distances: (i) 30 m horizontal distance; (ii) 15 m vertical distance from the top of the overflowed obstacle; 3.9.2 away from all of the following: (i) any known permanent or temporary take-off and landings areas for all types of manned aircraft; this also includes parking lots, parks and other areas where helicopters occasionally operate from, as well as sites where police and helicopter emergency medical services (HEMS), and search and rescue (SAR) helicopters occasionally operate from in cases of accidents or other emergencies; (ii) known military aircraft low-flying routes; (iii) any other known low-level manned aircraft operations in the intended area of operation (e.g. balloon operations authorised en route below 500 ft); (iv) harbour/coastal areas where SAR operations may transit or operate; (v) any known areas where other unmanned aircraft operate (including areas for model aircraft clubs or associations).		

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		3.10 The UAS operator should establish an air risk buffer to protect third parties in the air, outside the operational volume, if: 3.10.1 airspace classified as ARC-d is adjacent to the operational volume; or 3.10.2 the competent authority or the entity responsible for the airspace management considers it necessary to require that the protection of third parties in the air be ensured.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.11 The air risk buffer as per point 3.10 should be contained where the probability of encounter with manned aircraft and other airspace users is low, as defined by the competent authority.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		3.12 Before the flight, the UAS operator should assess the proximity of the planned UAS operation to manned aircraft activity.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Observers		n/a		
4. UAS operator and UAS operations conditions				
UAS operator and UAS operations	Declaration supported by data	4.1 The UAS operator should:		
		4.1.1 develop an operations manual (OM) (for the template, refer to AMC1 UAS.SPEC.030(3)(e) and to the complementary information in GM1 UAS.SPEC.030(3)(e));	<i>Please describe how this condition is met.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.2 develop a procedure to ensure that the security requirements applicable to the area of operations are complied with during the intended operation;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.3 develop measures to protect the UAS against unlawful interference and unauthorised access;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		4.1.4 develop procedures to ensure that all operations comply with Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data. In particular, the UAS operator should carry out a data protection impact assessment, when this is required by the data protection national authority of the Member State with regard to the application of Article 35 of that Regulation;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.5 develop guidelines for its remote pilots to plan UAS operations in a manner that minimises nuisance, including noise and other emissions-related nuisance, to people and animals;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.6 develop an emergency response plan (ERP) in accordance with the conditions for a 'medium' level of robustness (please refer to AMC3 UAS.SPEC.030(3)(e) ;	<i>Please describe how this condition is met.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.7 validate the operational procedures in accordance with the provisions for a 'medium' level of robustness included in AMC2 UAS.SPEC.030(3)(e) ;	<i>Please describe how this condition is met.</i>	'I declare compliance and that the description for meeting this condition is available to the competent authority for review.'
		4.1.8 ensure the adequacy of the contingency and emergency procedures and prove it through any of the following: (a) dedicated flight tests; (b) simulations, provided that the representativeness of the simulation means is proven for the intended purpose with positive results;	<i>Please describe how this condition is met</i>	'I declare compliance and that the description for meeting this condition is available to the competent authority for review.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		(c) any other means acceptable to the competent authority;		
		4.1.9 have a policy that defines how the remote pilot and any other personnel in charge of duties essential to the UAS operation can declare themselves fit to operate before conducting any operation;	<i>Please describe how this condition is met</i>	'I declare compliance and that the description for meeting this condition is available to the competent authority for review.'
		4.1.10 if the operation takes place in reserved or segregated airspace, as part of the procedures that are contained in the OM (point 4.1.1 above), include the description of the following:		
		(a) the method and means of communication with the authority or entity that is responsible for the management of the airspace during the entire period of the reserved or segregated airspace being active, as mandated by the authorisation; <i>Note: The communication method should be published in the notice to airmen (NOTAM), which activates the reserved airspace to also allow coordination with manned aircraft.</i>	<i>Please describe how this condition is met.</i>	'I declare compliance and that evidence is available to the competent authority for review.'
		(b) the personnel in charge of duties essential to the UAS operation, who are responsible for establishing that communication;	<i>Please describe how this condition is met.</i>	'I declare compliance and that evidence is available to the competent authority for review.'
		4.1.11 designate for each flight a remote pilot with adequate competency and other personnel in charge of duties essential to the UAS operation if needed;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		4.1.12 ensure that the UAS operation effectively uses and supports the efficient use of the radio spectrum in order to avoid harmful interference;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that supporting evidence is included in the OM.'
		4.1.13 keep for a minimum of 3 years and maintain up to date a record of the information on UAS operations, including any unusual technical or operational occurrences and other data as required by the declaration or by the operational authorisation;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance and that record-keeping data is available to the competent authority.'
UAS maintenance	Self-declaration	4.2 The UAS operator should:		
		4.2.1 ensure that the UAS maintenance instructions that are defined by the UAS operator are included in the OM and cover at least the UAS manufacturer's instructions and requirements, when applicable; and	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		4.2.2 ensure that maintenance staff follow the UAS maintenance instructions when performing maintenance;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		4.2.3 keep for a minimum of 3 years and maintain up to date a record of the maintenance activities conducted on the UAS;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		4.2.4 establish and keep up to date a list of the maintenance staff employed by the operator to carry out maintenance activities;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		4.2.5 comply with point UAS.SPEC.100 , if the UAS uses certified equipment.	<i>Please include a reference to the relevant chapter/section of the OM or indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
External services		4.3 The UAS operator should ensure that the level of performance for any externally provided service necessary for the safety of the flight is adequate for the intended operation. The UAS	<i>Please describe how this condition is met.</i>	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
	Self-declaration	operator should declare that this level of performance is adequately achieved.		
		4.4 The UAS operator should define and allocate the roles and responsibilities between the UAS operator and the external service provider(s), if applicable.	<i>Please describe how this condition is met.</i>	'I declare compliance.'
5. Conditions for the personnel in charge of duties essential to the UAS operation				
General	Self-declaration	5.1 The UAS operator should ensure that all personnel in charge of duties essential to the UAS operation are provided with competency-based theoretical and practical training specific to their duties, which consists of theoretical elements defined in AMC1 UAS.SPEC.050(1)(d) and practical elements defined in AMC2 UAS.SPEC.050(1)(d) .	<i>Please describe how this condition is met.</i>	'I declare compliance. Evidence of training is available for inspection at the request of the competent authority or its authorised representative. The training programme is documented in the OM.'
		5.2 The UAS operator should keep and maintain up to date a record of all the relevant qualifications and 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 for at least 3 years after those persons have ceased to be employed by the organisation or have changed position within the organisation.	<i>Please describe how this condition is met.</i>	'I declare compliance. Record-keeping data is available for inspection at the request of the competent authority.'
Remote pilot		5.3 The remote pilot has the authority to cancel or delay any or all flight operations under the following conditions:		
		5.3.1 the safety of persons is jeopardised;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.3.2 property on the ground is jeopardised;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
	Self-declaration	5.3.3 other airspace users are in jeopardy;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.3.4 there is a violation of the terms of the operational authorisation.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.4 The remote pilot should:		
		5.4.1 not perform any duties under the influence of psychoactive substances or alcohol, or when they are unfit to perform their tasks due to injury, fatigue, medication, sickness or other causes;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.4.2 be familiar with the manufacturer's instructions provided by the manufacturer of the UAS;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.4.3 obtain updated information relevant to the intended operation about any geographical zones defined in accordance with Article 15 of the UAS Regulation; and	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		5.4.4 ensure that the UAS is in a safe condition to complete the intended flight safely and, if applicable, check whether the direct remote identification is active and up to date.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Multi-crew cooperation (MCC)	Self-declaration	5.5 Where multi-crew cooperation (MCC) is required, the UAS operator should:		
		5.5.1 designate the remote pilot-in-command to be responsible for each flight;	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		5.5.2 include procedures to ensure the coordination between the remote crew members with robust and effective communication channels; those	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		procedures should cover as a minimum the following:		
		5.5.2.1 the assignment of tasks to the remote crew members; and	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		5.5.2.2 the establishment of step-by-step communication; and	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
		5.6 ensure that the training of the remote crew covers MCC.	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'
Maintenance staff	Self-declaration	5.7 Any staff member authorised by the UAS operator to perform maintenance activities should have been duly trained regarding the documented maintenance procedures.	<i>Please describe how this condition is met.</i>	'I declare compliance. Evidence of training is available at the request of the competent authority or its authorised representative.'
Personnel in charge of duties essential to the UAS operation are fit to operate	Self-declaration	5.8 The personnel in charge of duties essential to the UAS operation should declare that they are fit to operate before conducting any operation based on the policy defined by the UAS operator.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
6. Technical conditions				
General		6.1 The UAS should be equipped with means to monitor the critical parameters for a safe flight, and in particular the following:		
		6.1.1 UA position, height or altitude, ground speed or airspeed, attitude, and trajectory;	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.1.2 UAS energy status (fuel, battery charge, etc.); and	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
	Self-declaration	6.1.3 the status of critical functions and systems; as a minimum, for services based on RF signals (e.g. C2 link, GNSS, etc.), means should be provided to monitor the adequate performance and trigger an alert when the performance level becomes too low.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.2 The UAS performance and in particular its capability to keep the position in 4D space (latitude, longitude, height, and time) should be such that allows the remote pilot to conduct safely operations close to natural or artificial obstacles. <i>Note: The UA should be able to fly safely at a distance closer than 30 m to artificial or natural obstacles.</i>	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.3 The UAS should provide means to programme the UA flight path prior to take-off, or if utilising flexible routes, be equipped with means to avoid obstacles while staying within the intended operational volume.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.3.1. If flexible routes are utilised, the UAS should provide means to prevent the UA from breaching the horizontal and vertical limits of a programmable operational volume.	<i>Please include a reference to the relevant chapter/section of the OM, otherwise indicate 'n/a'.</i>	'I declare compliance.'
		6.4 The UAS should be protected against potential electromagnetic interferences from the infrastructure/facilities in the overflown area.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Human-machine interface (HMI)		6.5 The UAS information and control interfaces should be clearly and succinctly presented and should not confuse, cause unreasonable fatigue, or contribute to causing any disturbance to the personnel in charge of duties essential to the UAS operation such that this	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
	Self-declaration	could adversely affect the safety of the operation.		
		6.6 The UAS operator should conduct a UAS evaluation that considers and addresses human factors to determine whether the HMI is appropriate for the operation.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
C2 links and communication	Self-declaration	6.7 The UAS should comply with the appropriate requirements for radio equipment and the use of the RF spectrum.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.8 Protection mechanisms against interference should be used, especially if unlicensed bands (e.g. ISM) are used for the C2 link (mechanisms such as FHSS, DSSS or OFDM technologies, or frequency deconfliction by procedure).	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.9 The UAS should be equipped with a C2 link that is protected against unauthorised access to the C2 functions.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.10 In case of a loss of the C2 link, the UAS should have a reliable and predictable method for the UA to recover the C2 link or terminate the flight in a way that reduces the effect on third parties in the air or on the ground.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
		6.11 In the event of an emergency, the remote pilot should have effective means to communicate with the relevant bodies.	<i>Please include a reference to the relevant chapter/section of the OM.</i>	'I declare compliance.'
Tactical mitigation		n/a		
Containment	Declaration supported by data	6.12 To ensure a safe recovery from a technical issue that involves the UAS or an external system that supports the operation, the UAS should comply with the following basic containment provisions:		

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		6.12.1 no probable failure of the UAS or any external system that supports the operation should lead to operation outside the operational volume; and	<i>Please describe how this condition is met.</i>	'n/a since enhanced containment applies.' or 'I declare compliance.
		6.12.2 it is reasonably expected that a fatality will not occur from any probable failure of the UAS, or any external system that supports the operation. <i>Note: The term 'probable' should be understood in its qualitative interpretation, i.e. 'anticipated to occur one or more times during the entire system/operational life of an item'.</i>	<i>Please describe how this condition is met.</i>	A design and installation appraisal is available, and covers at least the following: — the design and installation features (independence, separation, and redundancy); and — the particular risks (e.g. hail, ice, snow, electromagnetic interference, etc.) relevant to the type of operation.'
		6.13 The following enhanced containment conditions should apply if the adjacent area includes an assembly of people or if the adjacent airspace is classified as ARC-c or ARC-d (in accordance with SORA):		
		6.13.1 The UAS should be designed to standards that are considered adequate by the competent authority and/or in accordance with a means of compliance that is acceptable to that authority such that:	<i>Please include a reference to the relevant chapter/section of the OM or indicate 'n/a'.</i>	'N/A since the basic containment applies' or 'I declare compliance with MoC Light-UAS.2511.
		6.13.1.1 the probability of the UA leaving the operational volume should be less than 10 ⁻⁴ /FH; and	<i>Please include a reference to the relevant chapter/section of the OM or indicate 'n/a'.</i>	Analysis and/or test data with supporting evidence are/is available.'

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		6.13.1.2 no single failure of the UAS or of any external system supporting the operation should lead to operation outside the ground risk buffer. <i>Note: The term ‘failure’ should be understood as an occurrence which affects the operation of a component, part, or element such that it can no longer function as intended. Errors may cause failures but are not considered to be failures. Some structural or mechanical failures may be excluded from the criterion if it can be shown that these mechanical parts were designed according to aviation industry best practices.</i>	<i>Please include a reference to the relevant chapter/section of the OM or indicate ‘n/a’.</i>	or ‘The UAS has a DVR demonstrating compliance with Light-UAS.2511.
		6.13.2 SW and AEH whose development error(s) could directly lead to operations outside the ground risk buffer should be developed according to an industry standard or methodology that is recognised as adequate by EASA. <i>Note 1: The proposed additional safety conditions cover both the integrity and the assurance levels.</i> <i>Note 2: The proposed additional safety conditions do not imply a systematic need to develop the SW and AEH according to an industry standard or methodology recognised as adequate by the competent authority. For instance, if the UA design includes an <u>independent</u> engine shutdown function that systematically prevents the UA from exiting the ground risk buffer due to single failures or an SW/AEH error of the flight controls from occurring, the intent of the conditions of point 6.13.1 above could be considered met.</i> <i>Note 3: For this PDRA, having adjacent airspace classified as ARC-c like a hospital heliport in uncontrolled airspace is also deemed subject to the</i>	<i>Please include a reference to the relevant chapter/section of the OM or indicate ‘n/a’.</i>	

PDRA characterisation and conditions				
Topic	Method of proof	Condition	Integrity ¹	Proof ²
		<i>above additional conditions (in addition to ARC-d, as per SORA Step #9 (c)).</i>		
Remote identification ³	Self-declaration	6.14 The UAS bears a unique serial number compliant with standard ANSI/CTA2063-A-2019, <i>Small Unmanned Aerial Systems Serial Numbers</i> , 2019, according to Article 40(4) of Regulation (EU) 2019/945 .	<i>Please describe how this condition is met.</i>	'I declare compliance.'
		6.15 The UAS is equipped with a remote identification system according to Article 40(5) of Regulation (EU) 2019/945 .	<i>Please describe how this condition is met.</i>	'I declare compliance.'
Lights ⁴	Self-declaration	6.16 If the UAS is operated at night, it is equipped with at least one green flashing light according to point UAS.SPEC.050(1)(l)(i) of the UAS Regulation.	<i>Please describe how this condition is met or indicate 'n/a'.</i>	'I declare compliance.' or 'n/a'

Table PDRA-G03.1 — Main limitations and provisions for PDRA-G03

³ Applicable from 1 July 2022.

⁴ Applicable from 1 July 2022.

AMC7 Article 11 Rules for conducting an operational risk assessment

ED Decision 2023/012/R

OPERATIONS OF UNMANNED FREE BALLOONS

An operation using an unmanned free balloon that complies with the provisions defined in Appendix 2 to Regulation (EU) No 923/2012 is considered meeting the safety objectives of the operational risk assessment laid down in [Article 11](#) and thus implies compliance with this Article.

Article 12 - Authorising operations in the 'specific' category

Regulation (EU) 2024/1110

1. The competent authority shall evaluate the risk assessment and the robustness of the mitigating measures that the UAS operator proposes to keep the UAS operation safe in all phases of flight.
2. The competent authority shall grant an operational authorisation when:
 - (a) the evaluation performed pursuant to paragraph 1 concludes that:
 - (i) the operational safety objectives take account of the risks of the operation;
 - (ii) the combination of mitigation measures concerning the operational conditions to perform the operations, the competence of the personnel involved and the technical features of the unmanned aircraft, are adequate and sufficiently robust to keep the operation safe in view of the identified ground and air risks;
 - (b) for UAS that are or will be certified pursuant to Article 40, point 1(d) of Delegated Regulation (EU) 2019/945, the UAS have:
 - (i) a valid certificate of airworthiness or a restricted certificate of airworthiness and, if the UA is subject to the environmental protection requirements laid down in point 21.B.85 of Regulation (EU) No 748/2012, a valid noise certificate; or
 - (ii) if the UA does not meet, or has not been shown to meet, the applicable airworthiness requirements, flight conditions approved according to Subpart P of Annex I (Part 21) to Regulation (EU) No 748/2012
 - (c) the UAS operator has provided to the competent authority a statement confirming that the intended operation complies with any applicable Union and national rules relating to it, in particular with regard to privacy, data protection, liability, insurance, security and environmental protection.
3. When the operation is not deemed sufficiently safe, the competent authority shall inform the applicant accordingly, giving reasons for its refusal to issue the operational authorisation.
4. The operational authorisation granted by the competent authority shall detail:
 - (a) the scope of the authorisation;
 - (b) the 'specific' conditions that shall apply:
 - i to the UAS operation and the operational limitations;
 - ii to the required competency of the UAS operator and, where applicable, of the remote pilots;
 - iii to the technical features of the UAS, including the certification of the UAS, if applicable;

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- (c) the following information:
- i the registration number of the UAS operator and the technical features of the UAS;
 - ii a reference to the operational risk assessment developed by the UAS operator;
 - iii the operational limitations and conditions of the operation;
 - iv the mitigation measures that the UAS operator has to apply;
 - v the location(s) where the operation is authorised to take place and any other locations in a Member States in accordance with Article 13;
 - vi all documents and records relevant for the type of operation and the type of events that should be reported in addition to those defined in Regulation (EU) No 376/2014 of the European Parliament and of the Council¹.
 - vii the certificate of airworthiness or restricted certificate of airworthiness and noise certificate, where such certificates have been issued;
 - viii the flight conditions approved in accordance with Regulation (EU) No 748/2012 where the UAS meets the conditions set out in [Article 40](#), point 1(d) of Delegated Regulation (EU) 2019/945 and the UA does not meet, or has not been shown to meet, the applicable airworthiness requirements.
5. Upon receipt of the declaration referred to in paragraph 5 of Article 5, the competent authority shall:
- (a) verify that it contains all elements set out in paragraph 2 of point [UAS.SPEC.020](#) of the Annex;
 - (b) if this is the case, provide the UAS operator with a confirmation of receipt and completeness without undue delay so that the operator may start the operation.

¹ Regulation (EU) No 376/2014 of the European Parliament and of the Council of 3 April 2014 on the reporting, analysis and follow-up of occurrences in civil aviation, amending Regulation (EU) No 996/2010 of the European Parliament and of the Council and repealing Directive 2003/42/EC of the European Parliament and of the Council and Commission Regulations (EC) No 1321/2007 and (EC) No 1330/2007 (OJ L 122, 24.4.2014, p. 18).

AMC1 Article 12(2)(a) Authorising operations in the ‘specific’ category

ED Decision 2025/018/R

GRANTING AN OPERATIONAL AUTHORISATION FOR UAS OPERATIONS CLASSIFIED IN A SAIL WHERE THE LEVEL OF ROBUSTNESS OF OSOs AND MITIGATIONS IS LOW

When the risk assessment defined in [Article 11](#) classifies the level of robustness of the operational safety objectives and the mitigations as ‘low’, the competent authority may issue an operational authorisation based on the applicant’s declaration of compliance with the related OSOs and mitigations.

The same applies in case the level of robustness is classified as ‘medium’ and the applicant has provided a declaration based on a means of compliance published by EASA.

For a VLOS UAS operation classified up to SAIL II according to [AMC1 Article 11](#) (SORA), the competent authority may only validate the compliance matrix (i.e. Chapter A.4 of [Annex A to AMC1 Article 11](#)) provided by the UAS operator. The competent authority may authorise the operation without receiving evidence (e.g. the operations manual).

The applicant is responsible to comply with all the requirements and produce or obtain any required evidence (e.g. operations manual) and keep it updated during the time of validity of the operational authorisation.

AMC1 Article 12(5) Authorising operations in the ‘specific’ category

ED Decision 2019/021/R

DECLARATION, VERIFICATION AND ACKNOWLEDGEMENT OF RECEIPT

- (a) The competent authority should establish an online system for the submission of operational declarations, which provides the submitter with an automatic acknowledgement of receipt when the submission has been successful.
- (b) For a submission to be considered successful, the online system should check that all the required information has been provided. Otherwise, the system should indicate to the submitter which parts of the information still need to be added to complete the submission of the declaration (e.g. fields to be filled in, compliance with requirements or statements to be accepted or acknowledged, etc.).
- (c) In order to facilitate cross-border operations, the acknowledgement of receipt should be written at least in English, in addition to the language of the Member State. A formula such as the following may be used:

‘The {*name of the competent authority*} acknowledges the receipt of the declaration submitted by {*name of the UAS operator and UAS operator registration number*}, on {*date of submission of the declaration*} related to the STS {*identification of the STS*}. The declaration has been found to be complete.’

Article 13 - Cross-border operations or operations outside the state of registration

Regulation (EU) 2020/639

1. When an UAS operator intends to conduct an operation in the ‘specific’ category for which an operational authorisation has already been granted in accordance with [Article 12](#), and which is intended to take place partially or entirely in the airspace of a Member State other than the Member State of registration, the UAS operator shall provide the competent authority of the Member State of intended operation with an application including the following information:
 - (a) a copy of the operational authorisation granted to the UAS operator in accordance with [Article 12](#); and
 - (b) the location(s) of the intended operation including the updated mitigation measures, if needed, to address those risks identified under [Article 11](#)(2)(b) which are specific to the local airspace, terrain and population characteristics and the climatic conditions.
2. Upon receipt of the application set out in paragraph 1, the competent authority of the Member State of intended operation shall assess it without undue delay and provide the competent authority of the Member State of registration and the UAS operator with a confirmation that the updated mitigation measures referred to in point (b) of paragraph 1 are satisfactory for the operation at the intended location. Upon receipt of that confirmation, the UAS operator may start the intended operation and the Member State of registration shall record the updated mitigation measures that the UAS operator has to apply in the operational authorisation issued in accordance with [Article 12](#).
3. When an UAS operator intends to conduct an operation in the ‘specific’ category for which a declaration has been made in accordance with paragraph 5 of [Article 5](#), and which is intended to take place partially or entirely in the airspace of a Member State other than the Member State of registration, the UAS operator shall provide the competent authority of the Member

State of the intended operation with a copy of the declaration submitted to the Member State of registration, as well as a copy of the confirmation of receipt and completeness.

4. Where a UAS operator holding an LUC with privileges in accordance with point [UAS.LUC.060](#) of the Annex intends to conduct an operation in the 'specific category' taking place partially or entirely in the airspace of a Member State other than the Member State of registration, the UAS operator shall provide the competent authority of the Member State of intended operation with the following information:
- (a) a copy of the term of approval received in accordance with point [UAS.LUC.050](#) of the Annex; and
 - (b) the location or locations of the intended operation in accordance with paragraph 1(b) of this Article.

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

ED Decision 2022/002/R

CROSS-BORDER OPERATIONS

- (a) A UAS operator that intends to conduct an operation, for which an operational authorisation is required, partially or fully in a Member State other than the State of registration, it should firstly obtain any required authorisation for that operation from the State of registration, unless the UAS operator has a LUC with the appropriate privileges. This process applies also when the UAS operator intends to conduct an operation only in a MS other than the State of registration.
- (b) The UAS operator should:
 - (1) identify the applicable local conditions in the area of operation;
 - (2) adapt the operational procedures, as necessary:
 - (i) to comply with the applicable local conditions¹; and
 - (ii) as required by the application to the new location(s) of the mitigation measures, identified in the operational authorisation;
 - (3) submit to the competent authority of the MS of operation (refer to <https://www.easa.europa.eu/domains/civil-drones/naa> for the links to the NAA websites) an application for a cross-border operation using the form provided in [AMC1 Article 13\(1\)](#), attaching the following:
 - (i) a copy of the operational authorisation issued by the competent authority of the MS of registration, or a copy of the LUC terms of reference if the operation is conducted under the privileges of the LUC;
 - (ii) those chapter(s)/section(s) of the operations manual (OM) providing the operational procedures and the relevant information, amended as necessary, to comply with the local conditions and apply the mitigation measures to the new intended location(s), unless the UAS operator holds a LUC with the appropriate privileges; and

¹ Consisting in compliance with the provisions defined in the applicable national regulations. Local conditions should be published by each MS.

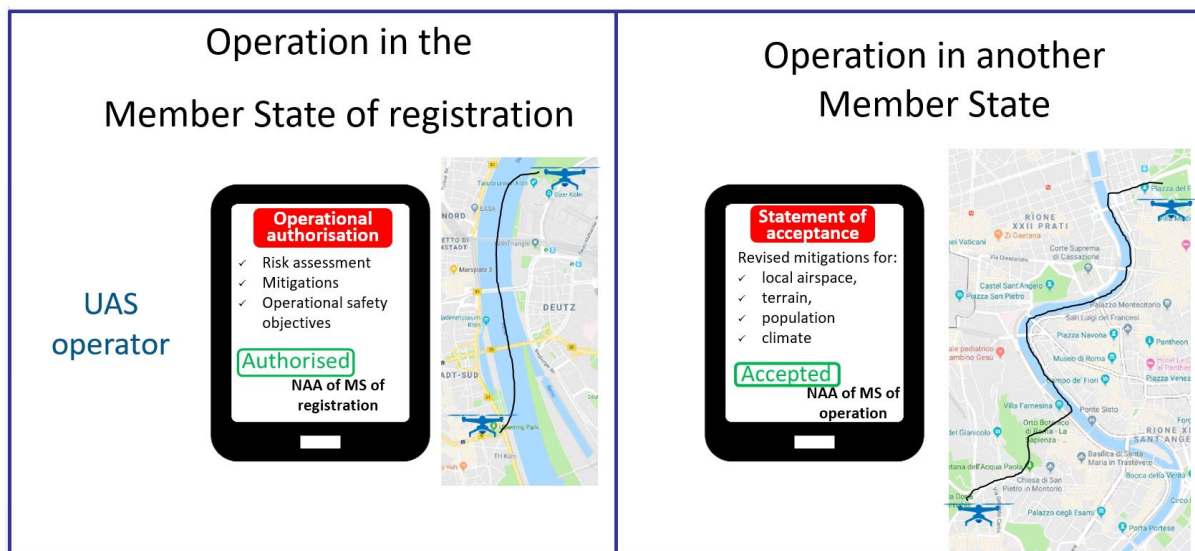
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- (iii) evidence of compliance of the amended procedures (refer to point ii) according to the level of robustness of the mitigation measures, if any, unless the UAS operator has a LUC with the appropriate privileges.
 - (c) The competent authority of the MS of operation should, without undue delay, evaluate the information provided by the UAS operator and verify the application of local condition(s) and of the updated mitigation measures applicable to the intended location(s) of the operation.
 - (d) Once the competent authority of the MS of operation is satisfied, it should provide the competent authority of the MS of registration and the UAS operator with the confirmation of acceptability (refer to the template provided in [AMC1 Article 13\(2\)](#)) that the updated mitigation measures and procedures are satisfactory for the intended location(s).
 - (e) After receiving the confirmation of acceptability, the UAS operator may start its operation.
 - (f) The competent authority of the MS of registration should issue a revision of the operational authorisation listing the additional new location(s), and provide a copy of the revised operational authorisation to the MS of authorisation and to the UAS operator.
 - (g) A UAS operator that holds a LUC with the appropriate privileges listed in its terms of reference may operate without following the above procedures. However, the UAS operator:
 - (1) must provide to the MS of operation the application using the form provided in [AMC1 Article 13\(1\)](#), attaching the following:
 - (i) a copy of the terms of approval received in accordance with point [UAS.LUC.050](#) of the Annex to the UAS Regulation; and
 - (ii) the location(s) of the intended operation in accordance with paragraph 1(b) of [Article 13\(1\)](#) of the UAS Regulation.
 - (2) If the LUC terms of reference include the privileges to assess the local conditions and to apply the mitigation measures in other locations, than the UAS operator may start the operation as soon as it has received confirmation of receipt and completeness of the application.
 - (3) If the LUC terms of reference do not include the privileges to assess the local conditions and/or apply the mitigation measures in other locations, than the UAS operator may start the operation only after it has received the confirmation of acceptability (refer to the template provided in [AMC1 Article 13\(2\)](#)) that the updated mitigation measures and procedures are satisfactory for the intended location(s).

GM1 Article 13 Cross-border operations or operations outside the state of registration

ED Decision 2019/021/R

GENERAL

The picture below illustrates an example of an authorisation, already provided by the competent authority, to conduct an operation in the Member State of registration, which is used to conduct the same operation in another Member State:

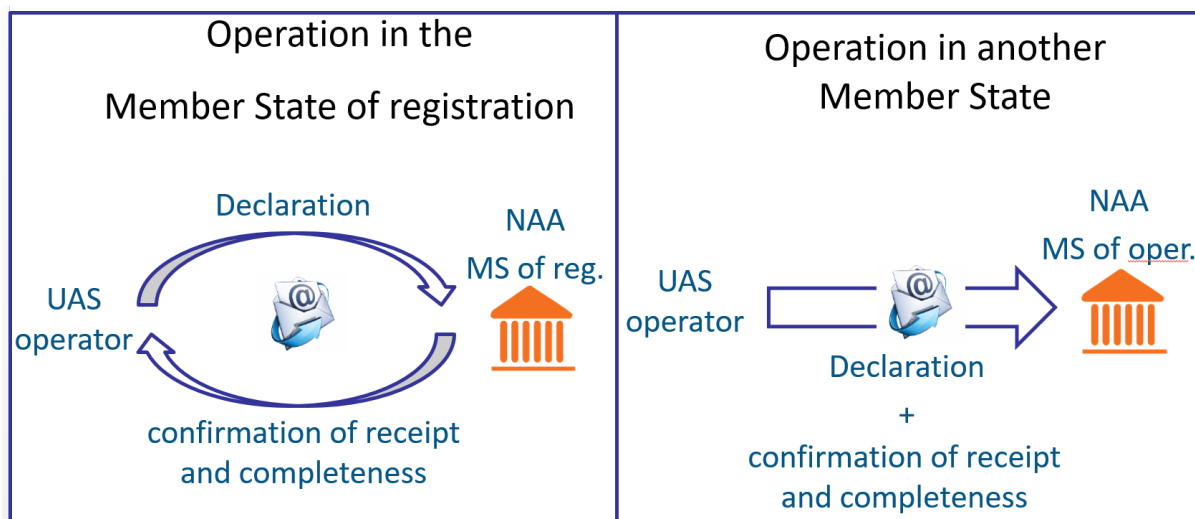


In the example, the UAS operator receives the authorisation from the competent authority of the Member State of registration where the mitigation measures are listed, and they may be adapted to the characteristics of the area of operation (e.g. the ground risk may be mitigated by flying over a river).

When the UAS operator intends to conduct the same operation in another Member State, a copy of the authorisation issued by the competent authority of the Member State of registration needs to be sent to the NAA of the Member State of the UAS operations. A number of elements of the mitigation measures may remain valid, such as the way the operator is organised, the competences of the pilot, or the characteristics of the UAS, for example. Other elements instead need to be adapted to the geography of the area of operation (e.g. the operations cannot be conducted mostly over the river, or it is necessary to identify a flight path meeting the equivalent conditions in terms of the ground risk, the local airspace, terrain and climate). On these points and also on the airspace, terrain and climate, the UAS operators are expected to review and possibly update the mitigation means, but only in relation to those elements.

The competent authority of the Member State of operation is not expected to review the full risk assessment, but to limit its activity to checking and providing the UAS operator and the competent authority of the Member State of registration with confirmation that the updated mitigation measures are satisfactory. Upon receipt of the confirmation, the UAS operator may start operating immediately, and the competent authority of registration will update the authorisation.

The picture below illustrates an example of the case when an operation complying with one of the STSs listed in Appendix 1 to the UAS Regulation is conducted in a Member State other than the state of registration:



The UAS operator firstly submits the declaration to the competent authority of the Member State of registration, which, if the declaration complies with the UAS Regulation, issues a confirmation of receipt and completeness. The UAS operator will then provide the competent authority of the Member State of operations with a copy of the declaration and the confirmation of completeness received by the competent authority of the Member State of registration. There is no need for further verification.

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

ED Decision 2022/002/R

APPLICATION FORM FOR A CROSS-BORDER UAS OPERATION

	Application for a cross-border UAS operation in the ‘specific’ category
Data protection: Personal data included in this application is processed by the competent authority pursuant to Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). Personal data will be processed for the purposes of the performance, management and follow-up of the application by the competent authority in accordance with Articles 12 and 13 of Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft. If the applicant requires further information concerning the processing of their personal data or exercising their rights (e.g. to access or rectify any inaccurate or incomplete data), they should refer to the point of contact of their competent authority. The applicant has the right to file a complaint regarding the processing of their personal data at any time to the national data protection supervisory authority.	

☐ New application		☐ Amendment to confirmation of acceptability NNN-CBO-xxxxx/yyy	
1. UAS operator and approval data			
1.1 UAS operator registration number			
1.2 UAS operator name			
1.3 Operational point of contact Name Telephone Email			
1.4 Type of approval	1.4.1 Operational authorisation / LUC number issued by the MS of registration	1.4.2 Expiry date	
☐ Operational authorisation ☐ LUC		DD/MM/YYYY	
2. Locations			
2.1 Expected date of start of the operation	DD/MM/YYYY	2.2 Expected end date	DD/MM/YYYY
2.3 Intended location(s) for the operation			
2.4 Operational volume height limit	_____ m (_____ ft)		
2.5 Airspace of the intended operation	☐ A ☐ B ☐ C ☐ D ☐ E ☐ F ☐ G ☐ U-space ☐ Other, specify		
2.6. Applicable local conditions			
3. Update of the application of the mitigation means and local conditions			
3.1 Updated 'Location of UAS operation' chapter of the operations manual (OM), if applicable			
3.2 Compliance evidence for updated mitigation measures and local conditions, if applicable			
4. Remarks			
5. Declaration of compliance			

I, the undersigned, hereby request the confirmation of acceptability of the cross-border UAS operation in xxx (name of the Member State) and declare that the UAS operation will comply with:

- any national rules related to privacy, data protection, liability, insurance, security, and environmental protection;
- the applicable requirements of [Regulation \(EU\) 2019/947](#); and
- the limitations and conditions defined in the operational authorisation provided by the competent authority of the Member State of registration and in the confirmation of acceptability of the cross-border UAS operation provided by the competent authority of the Member State of operation.

Moreover, I declare that the related insurance coverage, if applicable, will be in place at the start date of the UAS operation.

Date DD/MM/YYYY	Signature and stamp

Instructions for filling in the application form

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

- 1.1 UAS operator registration number in accordance with [Article 14](#) of the UAS Regulation.
- 1.2 UAS operator's name as declared during the registration process.
- 1.3 Contact details of the person responsible for the operation, in charge to answer possible operational questions raised by the competent authority.
- 1.4 Select one of the two options.
 - 1.4.1 Number of the operational authorisation or of the LUC terms of approval issued by the competent authority of the MS of registration. The referenced document should be attached to the application.
 - 1.4.2 Expiry date of the document listed in 1.4.2. If the validity is unlimited, indicate 'Unlimited'.
- 2.1 Date on which the UAS operator expects to start the operation.
- 2.2 Date on which the UAS operator expects to end the operation. The UAS operator may ask for an unlimited duration; in this case, indicate 'Unlimited'.
- 2.3 Location(s) in the MS of operation where the UAS operator intends to conduct the UAS operation. The identification of the location(s) should contain the full operational volume and ground risk buffer (the red line in Figure 1). The location(s) should be expressed in the same way as in the operational authorisation (e.g. 'generic' or 'precise' (refer to [GM2 UAS.SPEC.030\(2\)](#))).

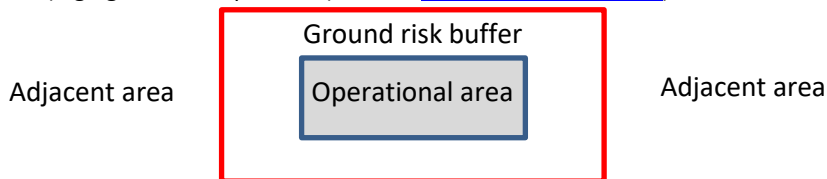


Figure 1 — Operational area and ground risk buffer

- 2.4 Insert the upper limit, expressed in metres and feet in parentheses, of the contingency volume (adding the air risk buffer, if applicable) using the AGL reference when the upper limit is below 150 m (492 ft) or use the MSL reference when the upper limit is above 150 m (492 ft).
- 2.5 Select one or more of the nine options. Select 'other' in case none of the previous is applicable (i.e. military areas).
- 2.6 List the local conditions applicable to the location(s) defined in point 2.3 (e.g. special frequency to be avoided, national insurance regulation, etc.). If needed, a separate document may be attached.
- 3.1 If operational procedures need to be updated to take into account the new locations or the local conditions, indicate either the identification and revision number of the OM or the document providing an extract of the OM including the chapter describing the operational procedures and the relevant information, amended by the UAS operator. This document should be attached to the application. Otherwise indicate 'n/a'.

- 3.2 If procedures are updated to address the characteristics of the new location or to meet the local conditions, indicate the compliance evidence file identification and revision number. This document should be attached to the application. Otherwise indicate 'n/a'.

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

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

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

ED Decision 2022/002/R

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

	Confirmation of acceptability of a cross-border UAS operation in the 'specific' category		
1. UAS operator and approval data			
1.1 UAS operator registration number			
1.2 UAS operator name			
1.3 Operational point of contact Name Telephone Email			
1.4 Type of approval	1.4.1 Operational authorisation / LUC number issued by the MS of registration	1.4.2 Expiry date	
☐ Operational authorisation ☐ LUC		DD/MM/YYYY	
2. Locations			
2.1 Location(s) for the operation			
2.2 Operational volume height limit	_____ m (_____ ft)		
3. Remarks			
4. Confirmation of acceptability			

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



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

- 1.1 UAS operator registration number in accordance with Article 14 of the UAS Regulation.
- 1.2 Name of the UAS operator as declared during the registration process.
- 1.3 Contact details of the person responsible for the operation, in charge to answer possible operational questions raised by the competent authority.
- 1.4 Select one of the two options.
 - 1.4.1 Number of the operational authorisation or of the LUC terms of approval issued by the competent authority of the MS of registration.
 - 1.4.2 Expiry date of the document listed in 1.4.2. If the validity is unlimited, indicate 'Unlimited'.
- 2.1 Location(s) in the MS of operation where the UAS operator is authorised to operate. The identification of the location(s) should contain the full operational volume and ground risk buffer (the red line in Figure 2). The location(s) should be expressed in the same way as in the operational authorisation (e.g. 'generic' or 'precise' (refer to [GM2 UAS.SPEC.030\(2\)](#))).

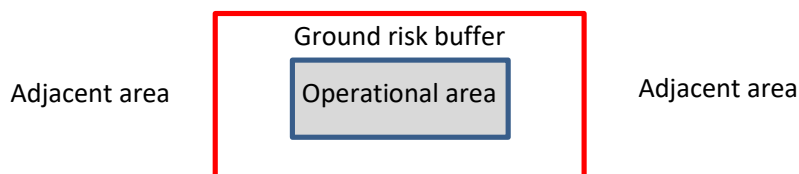


Figure 2 — Operational area and ground risk buffer

- 2.2 Insert the upper limit, expressed in metres and feet in parentheses, of the approved contingency volume (adding the air risk buffer, if applicable) using the AGL reference when the upper limit is below 150 m (492 ft), or use the MSL reference when the upper limit is above 150 m (492 ft).
3. Free-text field for the addition of any relevant remark.
- 4.1 Reference number of the confirmation of acceptability, as issued by the competent authority. The number should have the following format:
- NNN-CBO-xxxxx/yyy
- Where:
- ‘NNN’ is the ISO 3166 Alpha-3 code of the MS that issues the confirmation of acceptability of the operational authorisation number;
 - ‘CBO’ is a fixed field meaning ‘cross-border operation’;
 - ‘xxxxx’ are up to 12 alphanumeric characters defining the confirmation of acceptability of the operational authorisation number; and
 - ‘yyy’ are 3 alphanumeric characters defining the revision number of the confirmation of acceptability of the operational authorisation number. Each amendment of the confirmation of acceptability of the operational authorisation number will determine a new revision number.
- 4.2 The duration of the confirmation of acceptability of the operational authorisation may be unlimited; in this case, indicate ‘Unlimited’. The confirmation of acceptability will be valid for as long as the UAS operator complies with the relevant provisions of the UAS Regulation and with the conditions defined in the operational authorisation and in the confirmation of acceptability.
- 4.3 If the UAS operator has submitted to the competent authority of the MS of operation the full revised operations manual (OM), indicate its identification and revision number. Otherwise, in case only the chapter/section of the OM with the updated locations and procedures is submitted, provide its identification and revision number. In case no local conditions are identified or there is no need to update the procedures in the OM, indicate ‘n/a’.
- 4.4 If provided, indicate the compliance evidence file identification and revision number.

Note 1: In case of LUC, points 4.3 and 4.4 may not be filled in if according to the LUC terms of approval the organisation has the privilege to extend the operational authorisation to different locations.

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

Article 14 - Registration of UAS operators and certified UAS

Regulation (EU) 2020/639

1. Member States shall establish and maintain accurate registration systems for UAS whose design is subject to certification and for UAS operators whose operation may present a risk to safety, security, privacy, and protection of personal data or environment.
2. The registration systems for UAS operators shall provide the fields for introducing and exchanging the following information:
 - (a) the full name and the date of birth for natural persons and the name and their identification number for legal persons;
 - (b) the address of UAS operators;
 - (c) their email address and telephone number;

-
- (d) an insurance policy number for UAS if required by Union or national law;
 - (e) the confirmation by legal persons of the following statement: ‘All personnel directly involved in the operations are competent to perform their tasks, and the UAS will be operated only by remote pilots with the appropriate level of competency’;
 - (f) operational authorisations and LUCs held and declarations followed by a confirmation in accordance with [Article 12](#)(5)(b).
3. The registration systems for unmanned aircraft whose design is subject to certification shall provide the fields for introducing and exchanging the following information:
- (a) manufacturer’s name;
 - (b) manufacturer’s designation of the unmanned aircraft;
 - (c) unmanned aircraft’s serial number;
 - (d) full name, address, email address and telephone number of the natural or legal person under whose name the unmanned aircraft is registered.
4. Member States shall ensure that registration systems are digital and interoperable and allow for mutual access and exchange of information through the repository referred to in Article 74 of Regulation (EU) 2018/1139.
5. UAS operators shall register themselves:
- (a) when operating within the ‘open’ category any of the following unmanned aircraft:
 - i. with a MTOM of 250 g or more, or, which in the case of an impact can transfer to a human kinetic energy above 80 Joules;
 - ii. that is equipped with a sensor able to capture personal data, unless it complies with Directive 2009/48/EC.
 - (b) when operating within the ‘specific’ category an unmanned aircraft of any mass.
6. UAS operators shall register themselves in the Member State where they have their residence for natural persons or where they have their principal place of business for legal persons and ensure that their registration information is accurate. A UAS operator cannot be registered in more than one Member State at a time.
- Member States shall issue a unique digital registration number for UAS operators and for the UAS that require registration, allowing their individual identification.
- The registration number for UAS operators shall be established on the basis of standards that support the interoperability of the registration systems;
7. The owner of an unmanned aircraft whose design is subject to certification shall register the unmanned aircraft.
- The nationality and registration mark of an unmanned aircraft shall be established in line with ICAO Annex 7. An unmanned aircraft cannot be registered in more than one State at a time.
8. The UAS operators shall display their registration number on every unmanned aircraft meeting the conditions described in paragraph 5.
9. In addition to the data defined in point (2) Member States may collect additional identity information from the UAS operators.

AMC1 Article 14 Registration of UAS operators and ‘certified’ UAS

ED Decision 2019/021/R

NATIONAL CONTACT POINT FOR ACCESSING AND EXERCISING THE RIGHTS

The competent authority should identify and publish the contact point for accessing and exercising the rights in accordance with Regulation (EU) 2016/679¹ on the protection of natural persons with regard to the processing of personal data and on the free movement of such data.

GM1 Article 14(1) Registration of UAS operators and ‘certified’ UAS

ED Decision 2020/022/R

ACCURACY OF THE REGISTRATION SYSTEMS

UAS operators, when registering themselves or their certified UAS, are required to provide accurate information and update the registration data when it changes.

Member States are required to keep that information and registration data accurate in their registration systems.

An example of data that may change over time is:

- a UAS operator address, email address, and telephone number; and
- the validity of the insurance policy for the UAS.

To verify the validity of the insurance policy, Member States may require, at the time of registration, the UAS operator to provide the expiry date of the insurance policy and to consider the registration invalid after that date.

UAS operators, especially those conducting UAS operations for leisure, may decide to fly their UAS only for a short period; therefore, it is possible that even if the database of a registration system contains many registered UAS operators, only some of them are active. Member States may define a duration period for the validity of registration of all UAS operators and may revoke the registration number if the UAS operator does not renew that number before it expires. Member States may also decide to suspend or revoke the registration number if the UAS operator’s conduct justifies such a measure.

AMC1 Article 14(6) Registration of UAS operators and ‘certified’ UAS

ED Decision 2020/022/R

UAS OPERATOR REGISTRATION NUMBER

- (a) The unique UAS operator digital registration number that is issued by the Member States should consist of sixteen (16) alphanumeric characters in total, arranged as follows:
- (1) the first three (3) alphanumeric characters (upper-case only) corresponding to the ISO 3166 Alpha-3 code of the Member State of registration;
 - (2) followed by twelve (12) randomly generated characters that consist of alphanumeric characters (lower-case only); and

¹ 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).

- (3) one (1) character corresponding to the checksum that is generated in line with point (c).
- (b) The Member States should randomly generate three (3) additional alphanumerics (lower-case only) called 'secret digits'.
- (c) The Member States should generate a checksum by applying the Luhn-mod-36 algorithm to the fifteen (15) alphanumerics that result from the concatenation, in the following order, of:
 - (1) the twelve (12) alphanumerics of the UAS operator registration number defined in point (a)(2); and
 - (2) the three (3) randomly generated 'secret digits' that are defined in point (b).
- (d) For the Luhn-mod-36 algorithm, the mapping of the alphanumerics to the code-points should start with digits that are followed by lower-case letters, as shown below:

Alphanumeric	0	1	2	3	4	5	6	7	8	9	a	b	c	d	e	f	...	z
Code-point	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	...	35
- (e) At the time of registration, the Member State should provide the UAS operator with the full registration string that consists, in the following order, of:
 - (1) the UAS operator registration number as defined in point (a); and
 - (2) the three (3) randomly generated 'secret digits', separated by a hyphen '-' (ASCII code [DEC] 45).

GM1 to AMC1 Article 14(6) Registration of UAS operators and 'certified' UAS

ED Decision 2020/022/R

UAS OPERATOR REGISTRATION NUMBER

An example of a UAS operator registration number as defined in point (a) of [AMC1 Article 14\(6\)](#) Registration of UAS operators and 'certified' UAS is 'FIN87astrdge12k8', where:

- 'FIN' is the ISO 3166 Alpha-3 code of Finland;
- '87astrdge12k' is an example of the twelve (12) alphanumerics, as defined in point (a)(2) of [AMC1 Article 14\(6\)](#); and
- '8' is the checksum, i.e. the result of the application of the Luhn-mod-36 algorithm to the fifteen (15) alphanumerics that result from the concatenation of the twelve (12) alphanumerics of the UAS operator registration number and the three (3) randomly generated alphanumerics ('secret digits', as defined in point (b) of [AMC1 Article 14\(6\)](#)): '87astrdge12kxyz'.

An example of the full registration string, as defined in point (e) of [AMC1 Article 14\(6\)](#), to be provided by a Member State, is 'FIN87astrdge12k8-xyz', where:

- 'FIN87astrdge12k8' is the UAS operator registration number; and
- 'xyz' is an example of the three (3) randomly generated 'secret digits'.

The UAS operator must upload the UAS registration number and the three (3) 'secret digits' into the remote identification system of the UAS, if available, or into the electronic-identification system, if required by the geographical zone.

The UAS operator should not share with anybody the three (3) 'secret digits' that are used to enhance the protection of the UAS operator registration number from being illegally uploaded into a UA.

AMC1 Article 14(8) Registration of UAS operators and ‘certified’ UAS

ED Decision 2020/022/R

DISPLAY OF REGISTRATION INFORMATION

- (a) If the UAS operator owns the UAS or uses a UAS that is owned by a third party, it should:
 - (1) register itself;
 - (2) display on the UA the UAS operator registration number, which is received at the end of the registration process, in a way that the number is readable at least when the UA is on the ground, without using other devices than eyeglasses or corrective lenses; and
 - (3) upload the full string, which consists of the UAS operator registration number and the three (3) randomly generated alphanumerics, into the electronic identification system, if available.
- (b) A QR code (quick response code) may be used.
- (c) If the size of the UA does not allow the mark to be displayed in a visible way on the fuselage, or the UA represents a real aircraft where affixing the marking on the UA would spoil the realism of the representation, a marking inside the battery compartment is acceptable if the compartment is accessible.

Article 15 - Operational conditions for UAS geographical zones

Regulation (EU) 2020/639

1. When defining UAS geographical zones for safety, security, privacy or environmental reasons, Member States may:
 - (a) prohibit certain or all UAS operations, request particular conditions for certain or all UAS operations or require a prior flight authorisation for certain or all UAS operations;
 - (b) subject UAS operations to specified environmental standards;
 - (c) allow access to certain UAS classes only;
 - (d) allow access only to UAS equipped with certain technical features, in particular remote identification systems or geo awareness systems.
2. On the basis of a risk assessment carried out by the competent authority, Member States may designate certain geographical zones in which UAS operations are exempt from one or more of the ‘open’ category requirements.
3. When pursuant to paragraphs 1 or 2 Member States define UAS geographical zones, for geo awareness purposes they shall ensure that the information on the UAS geographical zones, including their period of validity, is made publicly available in a common unique digital format.

GM1 Article 15 Operational conditions for UAS geographical zones

ED Decision 2022/002/R

MEANS TO INFORM MANNED AVIATION OF UAS GEOGRAPHICAL ZONES

Depending on the duration of the validity of a UAS geographical zone, Member States may use AIPs and NOTAMs, as deemed appropriate, to inform manned aviation of:

- UAS geographical zones in which UASs are exempted from one or more of the ‘open’ category requirements in accordance with [Article 15\(2\)](#) of the UAS Regulation;

- other UAS geographical zones which are of relevance for manned aviation (e.g. U-space).

For temporary zones, NOTAMs may be used whereas for zones with longer duration, a publication in the AIP is more appropriate.

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

ED Decision 2022/002/R

CROSS-BORDER UAS GEOGRAPHICAL ZONE(S)

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

AMC2 Article 15(1) Operational conditions for UAS geographical zones

ED Decision 2022/002/R

DATA INTEGRITY

When data related to the UAS geographical zones described in [GM3 to Article 15\(1\)](#) Example 2 is processed, as a minimum, data integrity is ensured as prescribed in Part-ATM/ANS.OR.A.085(b)(2) 'Aeronautical data quality management' and in Part-AIS.TR.200(c) 'General' of [Commission Implementing Regulation \(EU\) 2017/373](#) of 1 March 2017¹.

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

ED Decision 2022/002/R

GENERAL ASPECTS

In line with the Chicago Convention², UAS geographical zones with restrictions and prohibitions should not be designated over the high seas / international airspace.

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

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

¹ Commission Implementing Regulation (EU) 2017/373 of 1 March 2017 laying down common requirements for providers of air traffic management/air navigation services and other air traffic management network functions and their oversight, repealing Regulation (EC) No 482/2008, Implementing Regulations (EU) No 1034/2011, (EU) No 1035/2011 and (EU) 2016/1377 and amending Regulation (EU) No 677/2011 (OJ L 62, 8.3.2017, p. 1) (<https://eur-lex.europa.eu/legalcontent/EN/TXT/?uri=CELEX%3A32017R0373&qid=1642077976836>).

² ICAO Doc 7300 — Convention on International Civil Aviation.

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

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

ED Decision 2022/002/R

DATA QUALITY

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

Example 1

If a UAS geographical zone is of relevance to manned aviation (e.g. U-space or zones established according to [Article 15\(2\)](#) of the UAS Regulation, it should, as far as practicable, comply with the data quality requirements applicable to prohibited/restricted/danger areas included in Appendix 1 'Aeronautical data catalogue' to Annex III (Part-ATM/ANS.OR) to [Commission Implementing Regulation \(EU\) 2017/373](#)¹.

Example 2

If a UAS geographical zone is relevant to UAS operations only, for example, over terrain that contains one of the infrastructures or areas/zones listed below, the MS may adapt the data quality requirements (e.g. accuracy) defined in Appendix 1 'Aeronautical data catalogue' to Annex III (Part-ATM/ANS.OR) to [Commission Implementing Regulation \(EU\) 2017/373](#) to the peculiarities of UAS operations:

- highways, express ways, and roads,
- railroads,
- hospitals,
- artworks,
- rural and urban areas,
- local restrictions to reduce noise, climate, and nature impact,
- nature parks,
- reserved areas,
- populated areas,
- bridges,
- critical sites,
- secure areas,
- electrical power lines,
- zones forbidden for aerial photography,

¹ Commission Implementing Regulation (EU) 2017/373 of 1 March 2017 laying down common requirements for providers of air traffic management/air navigation services and other air traffic management network functions and their oversight, repealing Regulation (EC) No 482/2008, Implementing Regulations (EU) No 1034/2011, (EU) No 1035/2011 and (EU) 2016/1377 and amending Regulation (EU) No 677/2011 (OJ L 62, 8.3.2017, p. 1) (<https://eur-lex.europa.eu/legalcontent/EN/TXT/?uri=CELEX%3A32017R0373&qid=1642077976836>).

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

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

ED Decision 2022/002/R

EXEMPTION(S) FROM ONE OR MORE OF THE REQUIREMENTS FOR UAS OPERATIONS IN THE 'OPEN' CATEGORY

Member States may designate UAS geographical zones in which UAS operations are exempted from one or more of the requirements for the 'open' category. UAS operators, when complying with the remaining requirements for the 'open' category, may operate without the need to apply for an operational authorisation.

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

ED Decision 2022/002/R

EXEMPTION(S) FROM ONE OR MORE OF THE REQUIREMENTS FOR UAS OPERATIONS IN THE 'OPEN' CATEGORY

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

- operations in the 'open' category, conducted with UASs that exceed 25 kg (a different mass threshold may be defined by the Member States);
- operations in the 'open' category, conducted at a height that exceeds 120 m (a different height threshold may be defined by the Member States).

Exemptions may also apply to all categories, for example, geographical zones where UASs are exempted from some technical features, such as electronic identification or geo-awareness.

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

ED Decision 2022/002/R

COMMON UNIQUE DIGITAL FORMAT

The 'common unique digital format' should be as described in Chapter 8 'UAS restriction zone data model' and Appendix 2 'INFORMATION DEFINITION AND DATA STRUCTURES' of EUROCAE ED-269 'MINIMUM OPERATIONAL PERFORMANCE STANDARD FOR GEOFENCING', Edition June 2020.

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

ED Decision 2022/002/R

PUBLICATION OF INFORMATION ON UAS GEOGRAPHICAL ZONES IN THE AERONAUTICAL INFORMATION PRODUCTS AND SERVICES

- (a) The Member States should publish in Section ENR 5.3.1 'Other activities of a dangerous nature' of the aeronautical information publication (AIP) the information on where and how the data on UAS geographical zones is publicly available in the common unique digital format.
- (b) The Member States should publish information on UAS geographical zones that are relevant to manned aircraft operations in Section ENR 5.1 'Prohibited, restricted and danger areas' of the AIP.
- (c) In addition to making UAS geographical zones publicly available in the common unique digital format, the Member States, when publishing data in the AIP, should ensure consistency.

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

ED Decision 2022/002/R

CROSS-BORDER UAS GEOGRAPHICAL ZONE(S)

All affected neighbouring Member States should make data available for the entire cross-border UAS geographical zone including the part(s) that is (are) located in their own territory and the part(s) that is (are) located in the territory(ies) of the neighbouring State(s) (the responsibility for data quality of the respective parts remains with the respective Member State). The conditions for the coordination process should ensure consistency across all resulting data sets.

AMC4 Article 15(3) Operational conditions for UAS geographical zones

ED Decision 2022/002/R

PUBLICATION OF MAPS OF UAS GEOGRAPHICAL ZONES

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

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

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

ED Decision 2022/002/R

EXAMPLES OF MAPS OF UAS GEOGRAPHICAL ZONES WITH COLOUR-CODE INDEX

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

The examples represent a possible approach of a Member State to present UAS geographical zones in a way which is proven to be compliant with the ED-269 standard. A maximum level of standardisation/harmonisation would be beneficial for the EU-wide implementation of [Article 15](#) of the UAS Regulation.

This example provides a simplified and clearly understandable way to visualise UAS geographical zones to non-ATM professionals. The set of colours is limited to the three colours of the traffic light scheme illustrating the purpose of a UAS geographical zone.

Detailed information related to a respective UAS geographical zone, such as details of restrictions, maximum height, maximum noise level, application procedure for flight authorisation, etc., may be provided when the UAS operator selects the respective zone on the website or on the smartphone application.

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

¹ Colour red, RGB 255,0,0

² Colour yellow, RGB 255,255,0

³ Colour green, RGB 0, 255,0

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

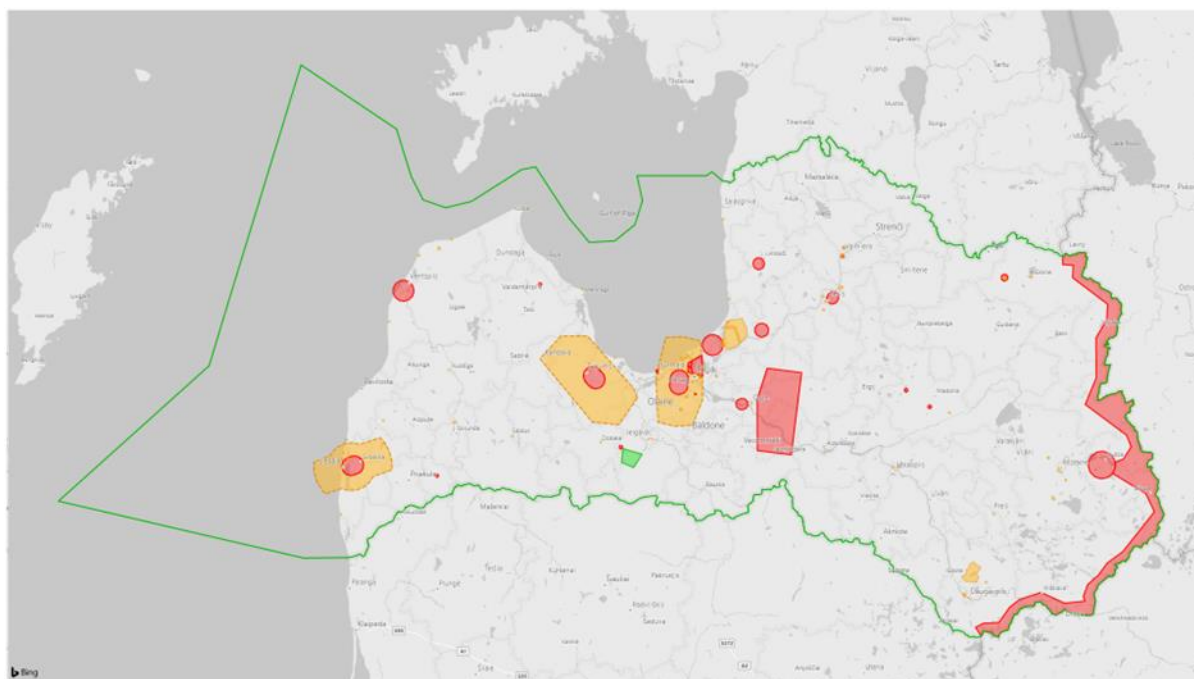


Figure 1 — Example of UAS geographical zones

¹ Colour blue, RGB 0.,0, 255

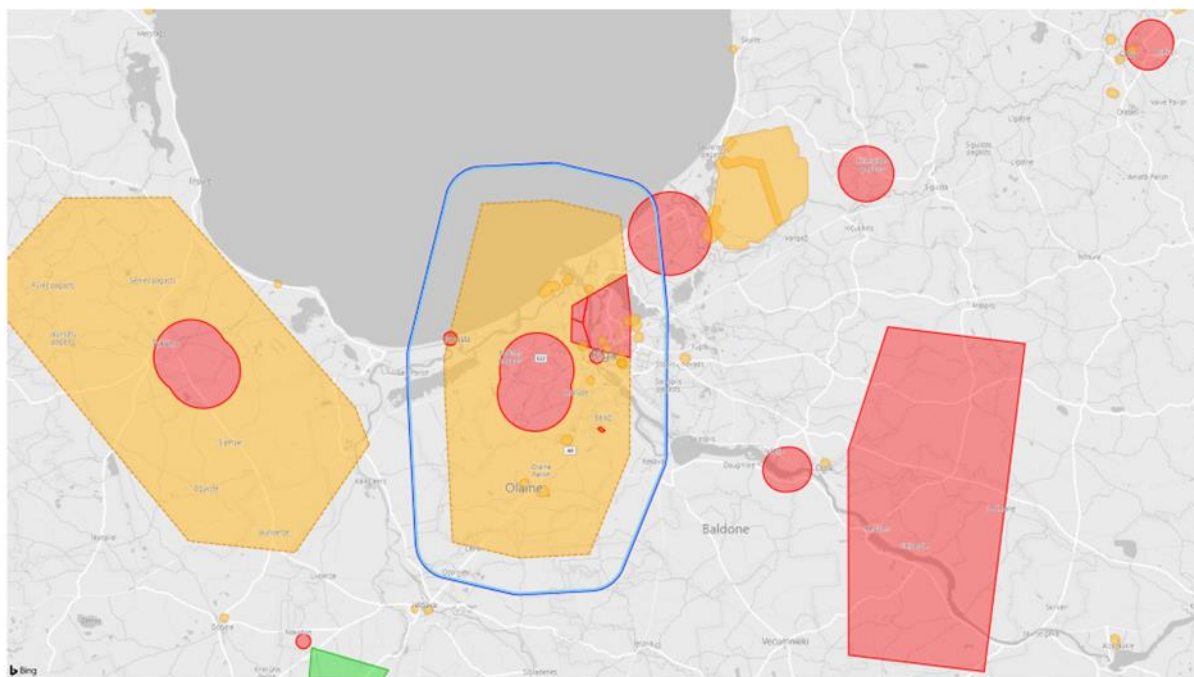


Figure 2 — Example of UAS geographical including representation of planned U-space

Article 16 - UAS operations in the framework of model aircraft clubs and associations

Regulation (EU) 2019/947

1. Upon request by a model aircraft club or association, the competent authority may issue an authorisation for UAS operations in the framework of model aircraft clubs and associations.
2. The authorisation referred to in paragraph 1 shall be issued in accordance with any of the following:
 - (a) relevant national rules;
 - (b) established procedures, organisational structure and management system of the model aircraft club or association, ensuring that:
 - i. remote pilots operating in the framework of model aircraft clubs or associations are informed of the conditions and limitations defined in the authorisation issued by the competent authority;
 - ii. remote pilots operating in the framework of model aircraft clubs or associations are assisted in achieving the minimum competency required to operate the UAS safely and in accordance with the conditions and limitations defined in the authorisation;
 - iii. the model aircraft club or association takes appropriate action when informed that a remote pilot operating in the framework of model aircraft clubs or associations does not comply with the conditions and limitations defined in the authorisation, and, if necessary, inform the competent authority;

- iv. the model aircraft club or association provides, upon request from the competent authority, documentation required for oversight and monitoring purposes.
- 3. The authorisation referred to in paragraph 1 shall specify the conditions under which operations in the framework of the model aircraft clubs or associations may be conducted and shall be limited to the territory of the Member State in which it is issued.
- 4. Member States may enable model aircraft clubs and associations to register their members into the registration systems established in accordance with Article 14 on their behalf. If this is not the case, the members of model aircraft clubs and associations shall register themselves in accordance with Article 14.

GM1 Article 16 UAS operations in the framework of model aircraft clubs and associations

ED Decision 2019/021/R

GENERAL

Unless differently provided by national regulation, a model aircraft club and association may obtain from the national competent authority an authorisation that is valid for all their members to operate UA according to conditions and limitations tailored for the club or association.

The model aircraft club and association will submit to the competent authority the procedures that all members are required to follow. When the competent authority is satisfied with the procedures, organisational structure and management system of the model aircraft club and association, it may provide an authorisation that defines different limitations and conditions from those in the UAS Regulation. The authorisation will be limited to the operations conducted within the authorised club or association and within the territory of the Member State of the authorised competent authority. The authorisation cannot exempt members of the club or association from registering themselves according to Article 14 of the UAS Regulation; however, it may allow a model club or association to register their members on their behalf.

The authorisation may also include operations by persons who temporarily join in with the activities of the club or association (e.g. for leisure during holidays or for a contest), as long as the procedures provided by the club or association define conditions acceptable to the competent authority.

GM2 Article 16 UAS operations in the framework of model aircraft clubs and associations

ED Decision 2019/021/R

OPTIONS TO OPERATE A MODEL AIRCRAFT

Model flyers have the following options to conduct their operations:

- (a) They may operate as members of a model club or association that has received from the competent authority an authorisation, as defined in Article 16 of the UAS Regulation. In this case, they should comply with the procedures of the model club or association in accordance with the authorisation. The authorisation should define all the deviations from the aforementioned Regulation granted to the model club or association's members. Members must register themselves in accordance with Article 14 of the UAS Regulation, except when the model aircraft clubs and associations have obtained from the Member State the right to register their members in the registration system.

- (b) In accordance with Article 15(2) of the UAS Regulation, Member States may define zones where UAS are exempted from certain technical requirements, and/or where the operational limitations are extended, including mass or height limitations. They may also define different height limitations for those zones.
- (c) The UAS may be operated in Subcategory A3, in which the following categories of UAS are allowed to fly according to the limitations and conditions defined in [UAS.OPEN.040](#):
 - (1) UAS with a class C0, C1, C2, C3, C4 CE mark;
 - (2) UAS that meet the requirements defined in Article 20(b) of the UAS Regulation; and
 - (3) privately built UAS with MTOMs of less than 25 kg.

GM1 Article 16(2)(b)(iii) UAS operations in the framework of model aircraft clubs and associations

ED Decision 2019/021/R

ACTION IN CASES OF OPERATIONS/FLIGHTS THAT EXCEED THE CONDITIONS AND LIMITATIONS DEFINED IN THE OPERATIONAL AUTHORISATION

When a model club or association is informed that a member has exceeded the conditions and limitations defined in the operational authorisation, appropriate measures will be taken, proportionate to the risk posed. Considering the level of risk, the model club or association decides whether the competent authority should be informed. In any case, occurrences that cause an injury to persons or where the safety of other aircraft was compromised, as defined in Article 125 of Regulation (EU) 2018/1139¹, must be reported by the model club or association to the competent authority.

Article 17 - Designation of the competent authority

Regulation (EU) 2019/947

1. Each Member State shall designate one or more entities as the competent authority for the tasks referred to in Article 18.
2. Where a Member State designates more than one entity as a competent authority it shall:
 - (a) clearly define the areas of competence of each competent authority in terms of responsibilities;
 - (b) establish appropriate coordination mechanism between those entities to ensure the effective oversight of all organisations and persons subject to this Regulation.

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.

GM1 Article 17 Designation of the competent authority

ED Decision 2019/021/R

GENERAL

Member States may also designate an entity as a competent authority only for specific tasks. It should be highlighted that in such a case, this entity must comply with Article 62(3) of Regulation (EU) 2018/1139 and is the one that will be audited by EASA under Article 85 (monitoring of Member State) of the same Regulation.

Article 18 - Tasks of the competent authority

Regulation (EU) 2019/947

The competent authority shall be responsible for:

- (a) enforcing this Regulation;
- (b) issuing, suspending or revoking certificates of UAS operators and licenses of remote pilots operating within the 'certified' category of UAS operations;
- (c) issuing remote pilots with a proof of completion of an online theoretical knowledge examination according to points [UAS.OPEN.020](#) and [UAS.OPEN.040](#) of the Annex and issuing, amending, suspending, limiting or revoking certificates of competency of remote pilots according to point [UAS.OPEN.030](#) of the Annex;
- (d) issuing, amending, suspending, limiting or revoking operational authorisations and LUCs and verifying completeness of declarations, which are required to carry out UAS operations in the 'specific' category of UAS operations;
- (e) keeping documents, records and reports concerning UAS operational authorisations, declarations, certificates of competency of the remote pilots and LUCs;
- (f) making available in a common unique digital format information on UAS geographical zones identified by the Member States and established within the national airspace of its State;
- (g) issuing a confirmation of receipt and completeness in accordance with Article 12(5)(b) or a confirmation in accordance with paragraph 2 of Article 13;
- (h) developing a risk-based oversight system for:
 - i. UAS operators that have submitted a declaration or hold an operational authorisation or an LUC;
 - ii. model clubs and associations that hold an authorisation referred to in Article 16;
- (i) for operations other than those in the 'open' category, establishing audit planning based on the risk profile, compliance level and the safety performance of UAS operators who have submitted a declaration, or hold a certificate issued by the competent authority;
- (j) for operations other than those in the 'open' category, carrying out inspections with regard to UAS operators who have submitted a declaration or hold a certificate issued by the competent authority inspecting UAS and ensuring that UAS operators and remote pilots comply with this Regulation;
- (k) implementing a system to detect and examine incidents of non-compliance by UAS operators operating in the 'open' or 'specific' categories and reported in accordance with paragraph 2 of Article 19;

- (l) providing UAS operators with information and guidance that promotes the safety of UAS operations;
- (m) establishing and maintaining registration systems for UAS whose design is subject to certification and for UAS operators whose operation may present a risk to safety, security, privacy, and protection of personal data or the environment.

GM1 Article 18(a) Tasks of the competent authority

ED Decision 2019/021/R

ENFORCEMENT

Member States are responsible for enforcing the UAS Regulation, and it is their decision to nominate the competent authority. In making this decision, Member States should consider that most of the UAS operations will occur in areas far from aerodromes, and therefore, the selected competent authority should employ personnel able to verify that the UAS operations conducted in such areas are safe. In addition, the issues that are likely to occur more often will be related to noise, privacy and security. Taking all this into account, law enforcement authorities may be well-placed to fulfil that role. Law enforcement authorities may take different forms, depending on the Member State's national legal framework.

AMC1 Article 18(e) Tasks of the competent authority

ED Decision 2022/002/R

DOCUMENTS, RECORDS AND REPORTS TO BE RETAINED

- (a) The competent authority should retain at least the following documentation:
 - (1) operational authorisations, in accordance with [Article 12\(2\)](#) of the UAS Regulation:
 - (i) the initial application for an authorisation as defined in [UAS.SPEC.030\(3\)](#) of Part-B and the associated documents;
 - (ii) the application(s) for updated operational authorisations;
 - (iii) the final version of the risk assessment performed by the UAS operator, and the supporting material;
 - (iv) the UAS operator's statement confirming that the intended UAS operation complies with any applicable European Union and national rules relating to it, in particular with regard to privacy, data protection, liability, insurance, security and environmental protection, in accordance with [Article 12\(2\)\(c\)](#) of the UAS Regulation;
 - (v) the procedures to ensure that all operations comply with [Regulation \(EU\) 2016/679](#) on the protection of natural persons with regard to the processing of personal data and on the free movement of such data;
 - (vi) confirmation by the competent authority of the Member State of operation that the updated mitigation measures are satisfactory for the operation at the intended location in accordance with [Article 13\(2\)](#) of the UAS Regulation;
 - (vii) when applicable, a procedure for coordination with the relevant service provider for the airspace if the entire operation, or part of it, is to be conducted in controlled airspace; and
 - (viii) up-to-date operational authorisation(s) with a table outlining successive changes;

-
- (2) declarations in accordance with [Article 12\(5\)](#) of the UAS Regulation:
 - (i) up-to-date declarations with a table outlining successive changes;
 - (ii) up-to-date confirmations of receipt and completeness, provided in accordance with [Article 12\(5\)\(b\)](#) of the UAS Regulation, with a table outlining successive changes;
 - (3) remote pilots' competency:
 - (i) proof of competency for remote pilots that have passed the online theoretical knowledge examination in accordance with [UAS.SPEC.020\(4\)\(b\)](#) of Part-B;
 - (ii) certificates of remote pilot competency for remote pilots that have passed the examination in accordance with [UAS.SPEC.030\(2\)\(c\)](#) of Part-B, with the declaration of completion of the practical self-training provided by the remote pilot; and
 - (iii) proof of competency or other certificates for remote pilots, as required by the STSs as defined in Appendix 1 to the UAS Regulation or the operational authorisations;
 - (4) Light UAS Operator Certificates:
 - (i) initial applications in accordance with [UAS.LUC.010\(2\)](#) of Part-C and associated documents;
 - (ii) applications for amendments to an existing LUC, and the associated documents; and
 - (iii) up-to-date terms of approval in accordance with [UAS.LUC.050](#) of Part-C, with a table outlining the successive changes.
 - (5) Documentation related to audits and inspections regarding the oversight of the competent authority by EASA, as well as the oversight of UAS operators and other entities by the competent authority. This documentation should include at least the following:
 - (i) training, qualifications, and authorisation of team leaders and team members of the competent authority;
 - (ii) audit/inspection programmes;
 - (iii) reports, including at least the following information:
 - objectives of the audit/inspection;
 - date of the audit/inspection;
 - type of the audit (on-site, off-site);
 - personnel involved;
 - summary of the main elements discussed;
 - reference to the related evidence.

Note: In case of off-site audits/inspections, it should also be indicated the extent to which remote information and communication technology (ICT) has been used in conducting the audit and the effectiveness of the ICT in achieving the audit/inspection objectives. Other aspects to be considered in case of off-site activities are digital data protection and security of access.

 - (iv) findings and related evidence;
 - (v) agreed corrections and corrective actions; and

- (vi) closure of findings of non-conformities and related evidence.
- (b) The records should be kept for at least 3 years after their validity date expires.

GM1 Article 18(h) Tasks of the competent authority

ED Decision 2019/021/R

GUIDELINES FOR RISK-BASED OVERSIGHT (RBO)

NOTE: The guidelines below are based on the document 'Practices for risk-based oversight', which may be found at the address below, and where further information may also be found:

<https://www.easa.europa.eu/document-library/general-publications/practices-risk-based-oversight>

That document:

- highlights the relationship between RBO and the (safety) management system, the management of change, the overall performance of the organisation and the oversight cycle;
- describes the interconnection, availability and exchange of data, which will significantly change the relationship between the authority and their regulated entities, as well as their ongoing management of safety;
- does not constitute regulatory material nor means of compliance nor guidance material. It reflects the RBO state of play to date, in an effort to gain a common understanding and to look ahead; and
- can be used as guidelines for competent authorities who have to implement RBO.

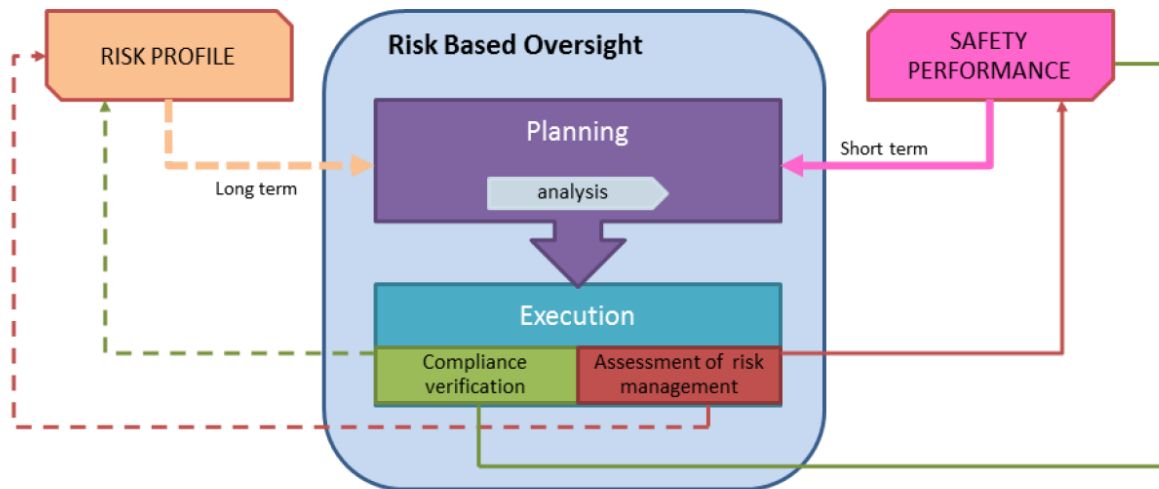
(a) General Definitions:

- (1) Oversight: the function by means of which a competent authority ensures that the applicable requirements are met by regulated entities.
- (2) Risk profile: the element of risks that are inherent to the nature and operations of the regulated entity, this includes the:
 - specific nature of the organisation;
 - complexity of its activities; and
 - risks stemming from the activities carried out.
- (3) Safety performance: the demonstration of how effectively a regulated entity can mitigate its risks, substantiated through the proven ability to:
 - comply with the applicable requirements;
 - implement and maintain effective safety management;
 - identify and manage safety risks; and
 - achieve and maintain safe operations.

The results of past certification or oversight also need to be taken into account.

- (4) RBO: a way of performing oversight, in which:
 - planning is driven by the combination of the risk profile and safety performance; and
 - execution focuses on the management of risk, besides ensuring compliance.

(b) The RBO scheme is summed-up by the drawing below:



- (1) the risk profile and oversight are described in paragraph 3 of the 'Practices for risk-based oversight';
- (2) the management of safety information and information sharing with other authorities are described in paragraph 4 of 'Practices for risk-based oversight';
- (3) the training and qualification of inspectors are described in paragraph 4.3 of 'Practices for risk-based oversight';
- (4) conducting risk-based audits is described in paragraph 5 of 'Practices for risk-based oversight'.

Article 19 - Safety information

Regulation (EU) 2024/1110

1. The competent authorities of the Member States and market surveillance and control authorities referred to in [Article 36](#) of Delegated Regulation (EU) 2019/945 shall cooperate on safety matters and establish procedures for the efficient exchange of safety information.
2. Each UAS operator shall report to the competent authority on any safety-related occurrence and exchange information regarding its UAS in compliance with Regulation (EU) No 376/2014.
3. The European Union Aviation Safety Agency ('the Agency') and the competent authorities shall collect, analyse and publish safety information concerning UAS operations in their territory in accordance with Article 119 of Regulation (EU) 2018/1139 and its implementing acts.
4. Upon receiving any of the information referred to in paragraphs 1, 2 or 3, the Agency and the competent authority shall take the necessary measures to address any safety issues on the best available evidence and analysis, taking into account interdependencies between the different domains of aviation safety, and between aviation safety, cyber security and other technical domains of aviation regulation.
5. Where the competent authority or the Agency takes measures in accordance with paragraph 4, it shall immediately notify all relevant interested parties and organisations that need to comply with those measures in accordance with Regulation (EU) 2018/1139 and its implementing acts.
6. Notwithstanding Regulation (EU) No 376/2014, the UAS operator of an unmanned aircraft which design is certified shall report to the design approval holder of the UAS or of the UAS component any safety-related event or condition of the UAS or the UAS component identified

by the organisation. In particular, the UAS operator shall report any accident or serious incident involving the UAS or the UAS component, which endangers or, if not duly corrected or addressed, could endanger the safety of the UAS or of any natural or legal person.

GM1 Article 19 Safety information

ED Decision 2019/021/R

EXCHANGE OF SAFETY INFORMATION

Cooperation between competent authorities should be organised pursuant to Article 61 of Regulation (EU) 2018/1139. Cooperation between market surveillance authorities and the exchange of safety-related and non-compliance information should be organised pursuant to Regulation (EC) No 765/2008¹. Article 19 of the UAS Regulation is intended to help organise the information flow and cooperation between the competent authorities on the one hand, and between the market surveillance authorities on the other.

Cooperation should be organised primarily at the Member State level. All the competent authorities concerned should make the best use of the information systems defined in Articles 22 ‘Exchange of information — Community Rapid Information System’ and 23 ‘General information support system’ of Regulation (EC) No 765/2008, as well as of the occurrence-reporting system of Regulation (EU) No 376/2014.

GM1 Article 19(1) Safety information

ED Decision 2022/002/R

CROSS-BORDER GEOGRAPHICAL ZONE(S)

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

GM1 Article 19(2) Safety information

ED Decision 2019/021/R

OCCURRENCE REPORT

According to Regulation (EU) No 376/2014, occurrences shall be reported when they refer to a condition which endangers, or which, if not corrected or addressed, would endanger an aircraft, its occupants, any other person, equipment or installation affecting aircraft operations. Obligations to report apply in accordance with Regulation (EU) No 376/2014, namely its Article 3(2), which limits the reporting of events for operations with UA for which a certificate or declaration is not required, to occurrences and other safety-related information involving such UA if the event resulted in a fatal or serious injury to a person, or it involved aircraft other than UA.

¹ Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93 (OJ L 218, 13.8.2008, p. 30).

Article 20 - Particular provisions concerning the use of certain UAS in the 'open' category

Regulation (EU) 2022/425

UAS types within the meaning of Decision No 768/2008/EC of the European Parliament and of the Council¹, which do not comply with Delegated Regulation (EU) 2019/945 and which are not privately-built are allowed to continue to be operated under the following conditions, when they have been placed on the market before 1 January 2024:

- (a) in subcategory A1 as defined in Part A of the Annex, provided that the unmanned aircraft has a maximum take-off mass of less than 250 g, including its payload;
- (b) in subcategory A3 as defined in Part A of the Annex, provided that the unmanned aircraft has a maximum take-off mass of less than 25 kg, including its fuel and payload.

Article 21 - Adaptation of authorisations, declarations and certificates

Regulation (EU) 2020/746

- 1. Authorisations granted to UAS operators, certificates of remote pilot competency and declarations made by UAS operators or equivalent documentation, issued on the basis of national law, shall remain valid until 1 January 2022.
- 2. By 1 January 2022 Member States shall convert their existing certificates of remote pilot competency and their UAS operator authorisations or declarations, or equivalent documentation, including those issued until that date, in accordance with this Regulation.
- 3. Without prejudice to [Article 14](#), UAS operations conducted in the framework of model aircraft clubs and associations shall be allowed to continue in accordance with relevant national rules and without an authorisation in accordance with [Article 16](#) until 1 January 2023.

Article 22 - Transitional provisions

Regulation (EU) 2022/425

Without prejudice to [Article 20](#), the use of UAS in the 'open' category which do not comply with the requirements of Parts 1 to 5 of the Annex to Commission Delegated Regulation (EU) 2019/945² shall be allowed for a transitional period ending on 31 December 2023, subject to the following conditions:

- (a) unmanned aircraft with a take-off mass of less than 500 g are operated within the operational requirements set out in points [UAS.OPEN.020](#)(1) of Part A of the Annex by a remote pilot having competency level defined by the Member State concerned;
- (b) unmanned aircraft with a take-off mass of less than 2 kg is operated by keeping a minimum horizontal distance of 50 meters from people and the remote pilots have a competency level at least equivalent to the one set out in point [UAS.OPEN.030](#)(2) of Part A of the Annex;
- (c) unmanned aircraft with a take-off mass of less than 25 kg is operated within the operational requirements set out in point [UAS.OPEN.040](#)(1) and (2) and the remote pilots have a

¹ Decision No 768/2008/EC of the European Parliament and of the Council of 9 July 2008 on a common framework for the marketing of products, and repealing Council Decision 93/465/EEC (OJ L 218 13.8.2008, p. 82).

² Commission Delegated Regulation (EU) 2019/945 of 12 March 2019 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems (OJ L 152, 11.6.2019, p. 1).

competency level at least equivalent to the one set out in point [UAS.OPEN.020\(4\)\(b\)](#) of Part A of the Annex.

GM1 Article 22(b) Transitional provisions

ED Decision 2022/002/R

UAS OPERATIONS CLOSE TO PERSONS

When operating a UAS with a maximum take-off mass (MTOM) of up to 2 kg, the remote pilot may fly the UAS keeping a minimum horizontal distance of 50 m from uninvolved persons (please refer to [GM1 Article 2\(18\)](#) for additional information).

Article 23 - Entry into force and application¹

Regulation (EU) 2022/425

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 31 December 2020.
2. [Article 5\(5\)](#) shall apply from 1 January 2024;
3. Points [UAS.OPEN.060\(2\)\(g\)](#) [UAS.SPEC.050\(1\)\(l\)\(i\)](#) of the Annex shall apply from 1 July 2022 and point [UAS.SPEC.050\(1\)\(l\)\(ii\)](#) of the Annex shall apply from 1 January 2024.
4. Without prejudice to [Article 21\(1\)](#), until 31 December 2023 Member States may accept declarations made by UAS operators in accordance with [Article 5\(5\)](#), based on national standard scenarios or equivalent, if those national scenarios meet the requirements of point [UAS.SPEC.020](#) of the Annex.
Such declarations shall cease to be valid from 1 January 2026.
5. Paragraph 3 of [Article 15](#) shall apply from 1 January 2022.

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

Done at Brussels, 12 March 2019.

For the Commission

The President

Jean-Claude JUNCKER

¹ This version of Article 23 is a compilation of the provisions related to the entry into force and application dates of Commission Implementing Regulations (EU) 2020/639, (EU) 2020/746, and (EU) 2021/1166. For the official version of each of those Regulations, please consult the *Official Journal of the European Union*.

ANNEX TO IMPLEMENTING REGULATION (EU) 2019/947 — UAS OPERATIONS IN THE 'OPEN' AND 'SPECIFIC' CATEGORIES

PART A — UAS OPERATIONS IN THE 'OPEN' CATEGORY

UAS.OPEN.010 General provisions

Regulation (EU) 2020/639

- (1) The category of UAS 'open' operations is divided into three subcategories A1, A2 and A3, on the basis of operational limitations, requirements for the remote pilot and technical requirements for UAS.
- (2) Where the UAS operation involves the flight of the unmanned aircraft starting from a natural elevation in the terrain or over terrain with natural elevations, 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.
- (3) 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.
- (4) By way of derogation from point (2), unmanned sailplanes with a MTOM, including payload, of less than 10 kg, may be flown at a distance in excess of 120 metres from the closest point of the surface of the earth, provided that the unmanned sailplane is not flown at a height greater than 120 metres above the remote pilot at any time.

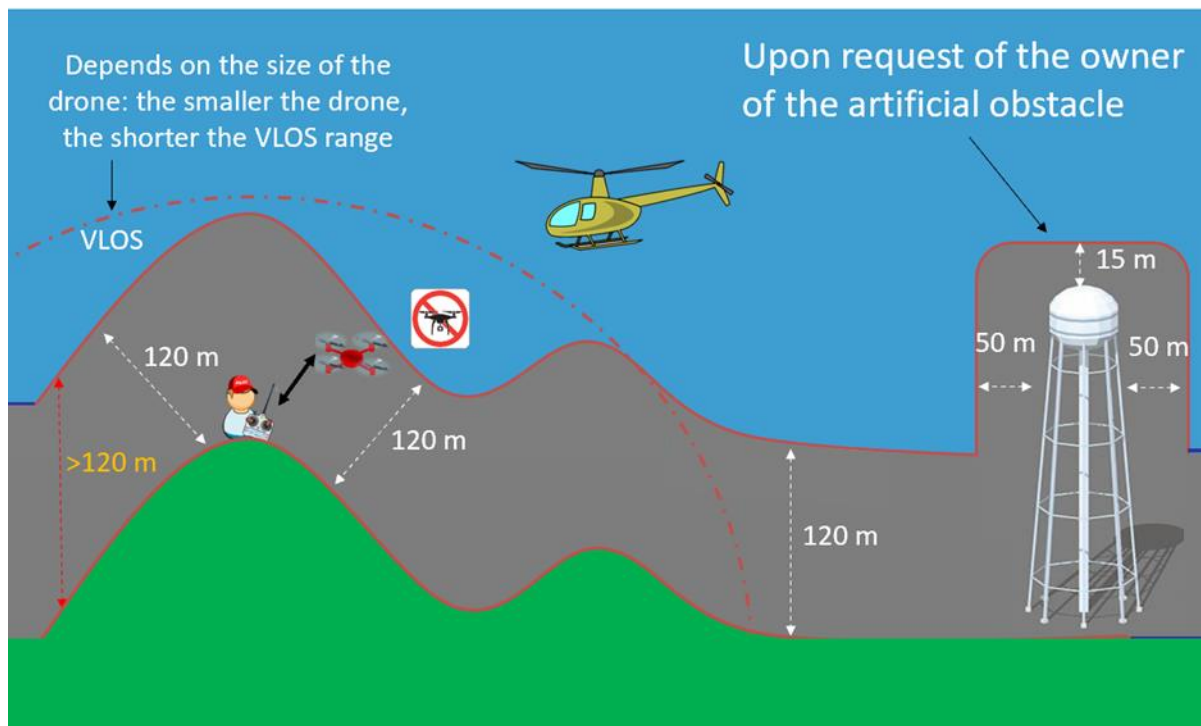
GM1 UAS.OPEN.010 General provisions

ED Decision 2022/002/R

MAXIMUM HEIGHT

The remote pilot must ensure that he or she keeps the unmanned aircraft (UA) at a distance less than 120 m (400 ft) from the terrain, and the picture below shows how the maximum height that the UA may reach changes according to the topography of the terrain. In addition, when the Member State (MS) has defined a geographical zone with a lower maximum height, the remote pilot must ensure that the UA always complies with the requirements of the geographical zone.

The entity responsible for the artificial obstacle referred to in point [UAS.OPEN.010\(3\)](#) needs to explicitly grant the unmanned aircraft system (UAS) operator permission to conduct an operation close to a tall man-made obstacle, e.g. a building, or antenna. No UAS operator should conduct an operation close to such an obstacle without permission from the entity responsible for the obstacle.



GM1 UAS.OPEN.010(4) General provisions

ED Decision 2019/021/R

OPERATIONS WITH UNMANNED SAILPLANES

This derogation was included to allow model gliders to continue to operate along slopes. Strictly applying the 120-metre distance from the closest point of the surface of the earth would have had disproportionate consequences. These operations have been conducted successfully for decades and have generated a micro-economy in certain countries. Two measures have been put in place to reduce the risk:

- (a) A maximum takeoff mass (MTOM), including the payload, limited to 10 kg to reduce the consequences of an impact. 10 kg should cover the vast majority of gliders in operation.
- (b) The maximum height above the remote pilot is limited to 120 m, which reduces the air risk.

UAS.OPEN.020 UAS operations in subcategory A1

Regulation (EU) 2020/639

UAS operations in subcategory A1 shall comply with all of the following conditions:

- (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 will be overflown. In the event of unexpected overflight of uninvolved persons, the remote pilot shall reduce as much as possible the time during which the unmanned aircraft overflies those persons;
- (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, but shall never overfly assemblies of people;

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- (3) by way of derogation from point (d) of paragraph 1 of [Article 4](#), be conducted, when the follow-me mode is active, up to a distance of 50 metres from the remote pilot;
- (4) be performed by a remote pilot who:
- (a) is familiar with manufacturer's instructions provided by the manufacturer of the UAS;
 - (b) in the case of an unmanned aircraft class C1, as defined in Part 2 of the Annex to Delegated Regulation (EU) 2019/945, has completed an online training course followed by completing successfully an online theoretical knowledge examination provided by the competent authority or by an entity designated by the competent authority of a Member State achieving at least 75% of the overall marks. The examination shall comprise 40 multiple-choice questions distributed appropriately across the following subjects:
 - (i) air safety;
 - (ii) airspace restrictions;
 - (iii) aviation regulation;
 - (iv) human performance limitations;
 - (v) operational procedures;
 - (vi) UAS general knowledge;
 - (vii) privacy and data protection;
 - (viii) insurance;
 - (ix) security.
- (5) be performed with an unmanned aircraft that:
- (a) has an MTOM, including payload, of less than 250 g and a maximum operating speed of less than 19 m/s, in the case of a privately built UAS; or
 - (b) meets the requirements defined in point (a) of [Article 20](#);
 - (c) is marked as class C0 and complies with the requirements of that class, as defined in Part 1 of the Annex to Delegated Regulation (EU) 2019/945; or
 - (d) is marked as class C1 and complies with the requirements of that class, as defined in Part 2 of the Annex to Delegated Regulation (EU) 2019/945 and is operated with active and updated direct remote identification system and geo-awareness function.

AMC1 UAS.OPEN.020(1) and (2) UAS operations in subcategory A1

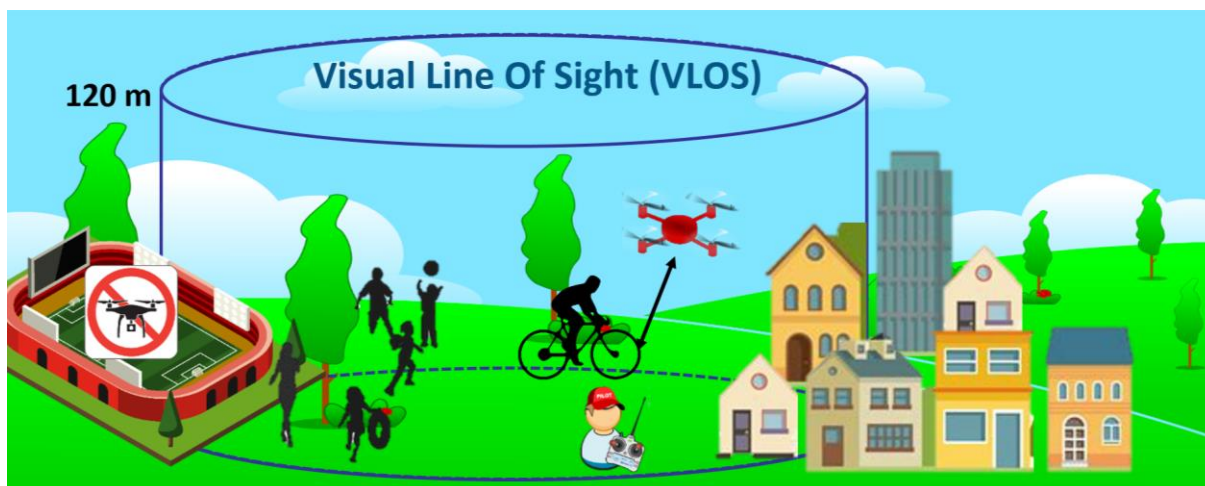
ED Decision 2019/021/R

OPERATIONAL LIMITATIONS IN SUBCATEGORY A1

As a principle, the rules prohibit overflying assemblies of people. Overflying isolated people is possible, but there is a distinction between class C1 and class C0 UAS or privately built UAS with MTOMs of less than 250 g.

- (a) For UAS in class C1, before starting the UAS operation, the remote pilot should assess the area and should reasonably expect that no uninvolved person will be overflown. This evaluation should be made taking into account the configuration of the site of operation (e.g. the existence of roads, streets, pedestrian or bicycle paths), and the possibility to secure the site and the time

of the day. In case of an unexpected overflight, the remote pilot should reduce as much as possible the duration of the overflight, for example, by flying the UAS in such a way that the distance between the UA and the uninvolved people increases, or by positioning the UAS over a place where there are no uninvolved people.



➤ **No flying over assemblies of people**



- reasonably expect that no uninvolved person is overflown. In case of unexpected overflight over uninvolved persons, the remote pilot shall reduce as much as possible the time during which the unmanned aircraft overflies those persons

- (b) It is accepted that UAS in class C0 or privately built UAS with MTOMs less than 250 g may fly over uninvolved people; however, this should be avoided whenever possible, and where it is unavoidable, extreme caution should be used.

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

ED Decision 2022/002/R

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

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

- (a) Air safety:
- (1) non-reckless behaviour, safety precautions for UAS operations and basic requirements regarding dangerous goods;
 - (2) starting or stopping the operations taking into account environmental factors, UAS conditions and limitations, remote pilot limitations and human factors;
 - (3) operation in visual line of sight (VLOS) and in very low level (VLL), which entails:
 - (i) keeping a safe distance from people, animals, property, vehicles, and other airspace users;

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- (ii) the identification of assemblies of people;
 - (iii) a code of conduct in case the UA encounters other traffic;
 - (iv) respecting the height limitation; and
 - (v) when using a UA observer, the responsibilities and communication between the UA observer and the remote pilot; and
 - (4) familiarisation with the operating environment, in particular:
 - (i) how to perform the evaluations of the presence of uninformed person in the overflowed area as required in [UAS.OPEN.020\(1\)](#) and [UAS.OPEN.040\(1\)](#); and
 - (ii) informing the people involved;
 - (b) Airspace restrictions:
 - (1) obtain and observe updated information about any flight restrictions or conditions published by the MS according to [Article 15](#) of the UAS Regulation¹;
 - (2) describe the types of geographical zones and the procedures for receiving a flight authorisation; and
 - (3) upload the geographical zones onto the geo-awareness system;
 - (c) Aviation regulations:
 - (1) Introduction to EASA and the aviation system;
 - (2) Regulation (EU) 2019/945 and Regulation (EU) 2019/947:
 - (i) their applicability to EU MSs;
 - (ii) subcategories in the 'open' category and the associated classes of UAS;
 - (iii) registration of UAS operators;
 - (iv) the responsibilities of the UAS operator;
 - (v) the responsibilities of the remote pilot; and
 - (vi) incident – accident reporting;
 - (d) Human performance limitations:
 - (1) the influence of psychoactive substances or alcohol or when the remote pilot is unfit to perform their tasks due to injury, fatigue, medication, sickness or other causes;
 - (2) human perception:
 - (i) factors influencing VLOS;
 - (ii) the distance of obstacles and the distance between the UA and obstacles;
 - (iii) evaluation of the speed of the UA;
 - (iv) evaluation of the height of the UA;
 - (v) situational awareness; and

¹ Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft (OJ L 152, 11.6.2019, p. 45).

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- (vi) night operations.
 - (e) Operational procedures:
 - (1) pre-flight:
 - (i) assessment of the area of operation and the surrounding area, including the terrain and potential obstacles and obstructions for keeping VLOS of the UA, potential overflight above uninvolved persons, and the potential overflight above critical infrastructure;
 - (ii) identification of a safe area where the remote pilot can perform a practice flight;
 - (iii) environmental and weather conditions (e.g. factors that can affect the performance of the UAS such as electromagnetic interference, wind, temperature, etc.); methods of obtaining weather forecasts; and
 - (iv) checking the condition of the UAS;
 - (2) in-flight:
 - (i) normal procedures;
 - (ii) determine the UA's attitude, altitude, and direction of flight;
 - (iii) observe the airspace for other air traffic or hazards;
 - (iv) determine that the UA does not pose a danger for the life or property of other people; and
 - (v) contingency and emergency procedures for abnormal situations:
 - (a) managing the UAS flight path in abnormal situations;
 - (b) managing the situation when the UAS positioning equipment is impaired;
 - (c) managing the situation of incursion of a person into the area of operation, and taking appropriate measures to maintain safety;
 - (d) managing the exit from the area of operation as defined during the flight preparation;
 - (e) managing the situation when a manned aircraft flies near the area of operation;
 - (f) managing the incursion of another UAS into the area of operation;
 - (g) dealing with a situation of a loss of attitude or position control caused by external phenomena; and
 - (h) following the C2 loss-of-link procedure;
 - (3) post-flight:
 - (i) maintenance; and
 - (ii) logging of flight details;
 - (f) UAS general knowledge:
 - (1) basic principles of flight;
 - (2) the effect of environmental conditions on the performance of the UAS;

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- (3) principles of command and control:
 - (i) overview;
 - (ii) data link frequencies and spectrums; and
 - (iii) automatic flight modes, override and manual intervention;
 - (4) familiarisation with the instructions provided by the user's manual of a UAS, and in particular with regard to:
 - (i) overview of the main elements of the UAS;
 - (ii) limitations (e.g. mass, speed, environmental, duration of battery, etc.);
 - (iii) controlling the UAS in all phases of flights (e.g. the take-off, hovering in mid-air, when applicable, flying basic patterns and landing);
 - (iv) features that affect the safety of flight;
 - (v) setting the parameters of the lost link procedures;
 - (vi) setting the maximum height;
 - (vii) procedures to load geographical zone data into the geo-awareness system;
 - (viii) procedures to load the UAS operator registration number into the direct remote identification system;
 - (ix) safety considerations:
 - (A) instructions to secure the payload;
 - (B) precautions to avoid injuries from rotors and sharp edges; and
 - (C) the safe handling of batteries;
 - (x) Maintenance instructions:
 - (g) Privacy and data protection:
 - (1) understanding the risk posed to privacy and data protection; and
 - (2) the guiding principles for data protection under the GDPR¹;
 - (h) Insurance:
 - (1) liability in case of an accident or incident;
 - (2) general knowledge of the EU regulations; and
 - (3) awareness of the possible different national requirements for insurance in the MSs.
 - (i) Security:
 - (1) an understanding of the security risk;
 - (2) an overview of the EU regulations;
 - (3) awareness of the possible different national requirements for security in the MSs.

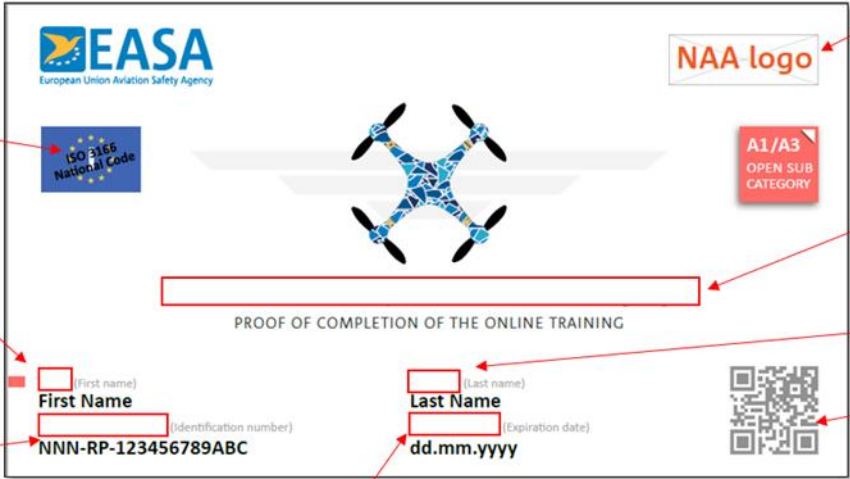
¹ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) (OJ L 119, 4.5.2016, p. 1).

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

ED Decision 2022/002/R

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

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



EASA
European Union Aviation Safety Agency

ISO 3166 National Code

NAA logo

A1/A3 OPEN SUB CATEGORY

PROOF OF COMPLETION OF THE ONLINE TRAINING

First Name (First name)

Last Name (Last name)

Identification number (Identification number)

Expiration date (Expiration date)

QR code

Insert the ISO 3166 national code in the centre of the EU flag

Insert the words "First name" in the MS national language.

Insert the words "Identification number" in the MS national language.

Insert the words "Proof of completion of the online training" in the MS national language.

Insert the words "Last name" in the MS national language.

Insert a QR code providing a link to the national database where the information related to the remote pilot is stored.

Insert the words "Expiration date" in the MS national language.

The remote pilot identification number that is provided by the competent authority or the entity that is designated by the competent authority that issues the proof of completion should have the following format:

NNN-RP-xxxxxxxxxxxx

Where:

- 'NNN' is the ISO 3166 Alpha-3 code of the MS that issues the proof of completion;
- 'RP' is a fixed field meaning 'remote pilot'; and
- 'xxxxxxxxxxxx' are 12 alphanumeric characters (lower-case only) defined by the competent authority or the entity that is designated by the competent authority that issues the proof of completion.

Example: (FIN-RP-123456789abc)

The QR code provided a link to the national database where the information related to the remote pilot is stored. Through the 'remote pilot identification number', all information related to the training

of the remote pilot can be retrieved by authorised bodies (e.g. competent authorities, law enforcement authorities, etc.) and authorised personnel.

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

ED Decision 2022/002/R

MODIFICATION OF A UAS WITH A CLASS IDENTIFICATION LABEL

When placing UASs with a class identification label on the market, manufacturers should ensure the compliance of those UASs with the applicable regulatory requirements. It is the responsibility of UAS operators to ensure that those UASs remain compliant throughout their lifetime. UAS operators should, therefore, not make any modifications to a UAS in class C0, C1, C2, C3 or C4 that breach compliance with the product requirements, unless the modification is foreseen by the manufacturer and documented in the manufacturer's instructions.

The replacement of a part by a similar one for maintenance purposes is not considered a modification, provided the operator uses an original part or a part that complies with the characteristics defined by the manufacturer in the list of replaceable parts provided in the manufacturer's instructions.

The affixation of payload is not considered a modification provided that affixing a payload is not forbidden by the manufacturer and the payload complies with the characteristics provided in the manufacturer's instructions. Affixing a payload when it is forbidden by the manufacturer or affixing a payload that does not comply with the characteristics provided in the manufacturer's instructions is strictly forbidden.

If the payload does not comply with the characteristics of the allowed payloads or if maintenance is not performed according to the manufacturer's instructions, it is then considered a modification that invalidates the class conformity. The class identification label must be removed from the UAS identification label and the modified UAS may only be operated in the 'specific' category in accordance with Subpart B of Annex to the UAS Regulation.

Changes to UASs with a class identification label C4 are allowed, and such UASs can be considered 'privately built' UASs and continue to be operated in subcategory A3 of the 'open' category.

GM1 UAS.OPEN.020(5)(c) and (d), UAS.OPEN.030(3) and UAS.OPEN.040(4)(c), (d) and (e) UAS operations in subcategories A1, A2 and A3

ED Decision 2019/021/R

MODIFICATION OF A UAS WITH A CE CLASS MARK

Modifications to UAS that breach compliance with the requirements for the CE marking are those that affect the weight or performance so that they are outside the specifications or the instructions provided by the manufacturer in the user manual. A replacement of a part with another that has the same physical and functional characteristics is not considered to be a breach of the requirements for the CE marking (e.g. a replacement of a propeller with another of the same design). The UA user manual should define instructions for performing maintenance and applying changes that do not breach compliance with the CE marking requirements.

UAS.OPEN.030 UAS operations in subcategory A2

Regulation (EU) 2020/639

UAS operations in subcategory A2 shall comply with all of the following conditions:

- (1) be conducted in such a way that the unmanned aircraft does not overfly uninvolved persons 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 an uninvolved person 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 overflowed area.
- (2) be performed by a remote pilot who is familiar with manufacturer's instructions provided by the manufacturer of the UAS and holds a certificate of remote pilot competency issued by the competent authority or by an entity designated by the competent authority of a Member State. 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 at an entity designated by the competent authority of a Member State achieving at least 75% of the overall marks. 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.
- (3) be performed with an unmanned aircraft which is marked as class C2 and complies with the requirements of that class, as defined in Part 3 of the Annex to Delegated Regulation (EU) 2019/945, and is operated with active and updated direct remote identification system and geo-awareness function.

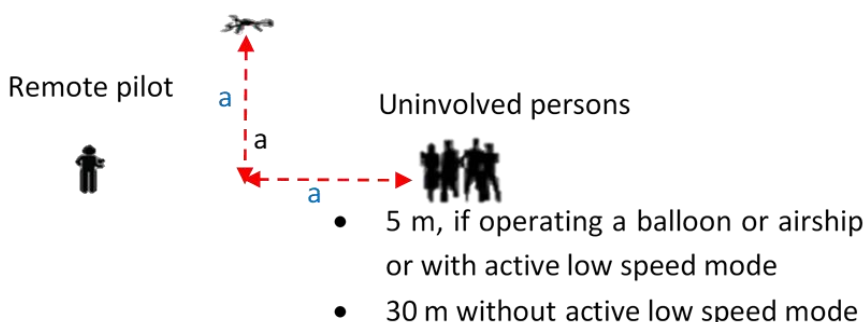
AMC1 UAS.OPEN.030(1) UAS operations in subcategory A2

ED Decision 2019/021/R

SAFE DISTANCE FROM UNINVOLVED PERSONS

- (a) The minimum horizontal distance of the UA from uninvolved persons should be defined as the distance between the points where the UA would hit the ground in the event of a vertical fall and the position of the uninvolved persons.

- (b) As a reference, when the UA is operating in close proximity to people, the remote pilot should keep the UA at a lateral distance from any uninvolved person that is not shorter than the height ('1:1 rule', i.e. if the UA is flying at a height of 30 m, the distance from any uninvolved person should be at least 30 m).
- (c) In any case, the distance from uninvolved persons should always be greater than:
- (1) 5 m, when the low-speed mode function on the UA is activated and set to 3 m per second;
 - (2) 5 m, when operating a UAS balloon or airship; or
 - (3) 30 m in all other cases.



GM1 UAS.OPEN.030(1) UAS operations in subcategory A2

ED Decision 2019/021/R

SAFE DISTANCE FROM UNINVOLVED PERSONS

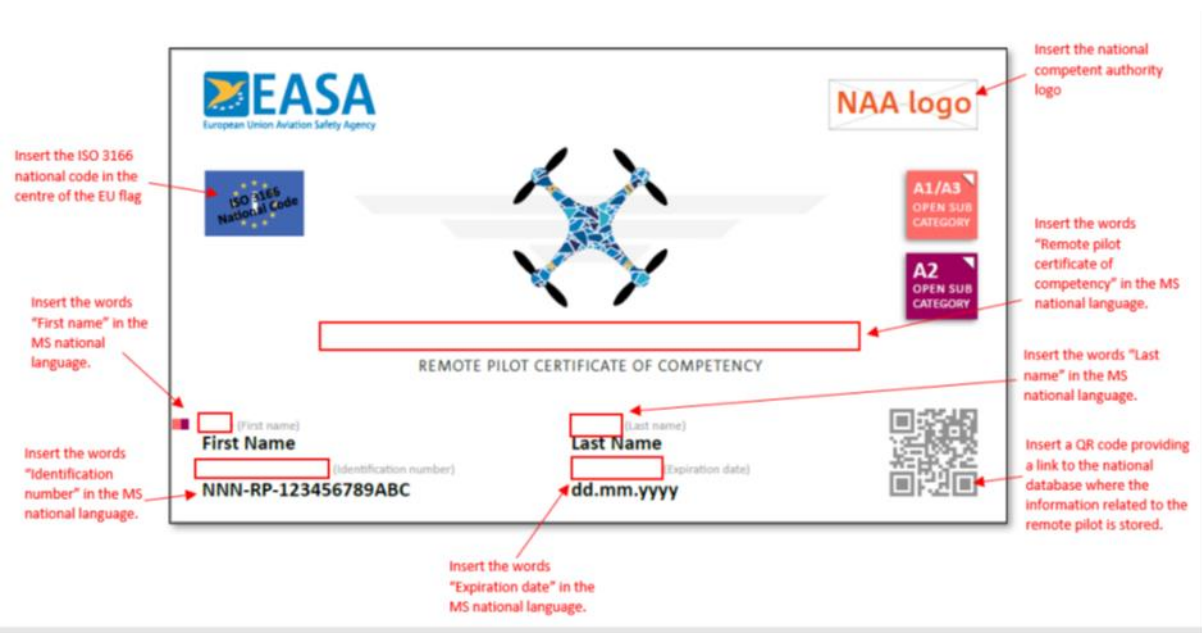
The safe distance of the UA from uninvolved persons is variable and is heavily dependent on the performance and characteristics of the UAS involved, the weather conditions and the segregation of the overflown area. The remote pilot is ultimately responsible for the determination of this distance.

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

ED Decision 2022/002/R

REMOTE PILOT CERTIFICATE OF COMPETENCY

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



The diagram shows a 'REMOTE PILOT CERTIFICATE OF COMPETENCY' form. It includes the EASA logo at the top left, a central drone illustration, and a QR code at the bottom right. Red arrows point to specific fields with instructions:

- ISO 3166 national code in the centre of the EU flag
- Insert the words "First name" in the MS national language.
- Insert the words "Identification number" in the MS national language.
- Insert the words "Expiration date" in the MS national language.
- Insert the words "Last name" in the MS national language.
- Insert a QR code providing a link to the national database where the information related to the remote pilot is stored.
- Insert the national competent authority logo
- Insert the words "Remote pilot certificate of competency" in the MS national language.

Fields shown include: First Name, Last Name, Identification number (NNN-RP-123456789ABC), and Expiration date (dd.mm.yyyy).

The remote pilot identification number that is provided by the competent authority or the entity that is designated by the competent authority that issues the certificate of remote pilot competency should have the following format:

NNN-RP-xxxxxxxxxxx

Where:

- 'NNN' is the ISO 3166 Alpha-3 code of the MS that issues the proof of completion;
- 'RP' is a fixed field meaning 'remote pilot'; and
- 'xxxxxxxxxxx' are 12 alphanumeric characters (lower-case only) defined by the competent authority or the entity that is designated by the competent authority that issues the proof of completion.

Example: (FIN-RP-123456789abc)

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

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

ED Decision 2022/002/R

PRACTICAL-SKILLS SELF-TRAINING

- (a) The aim of the practical-skills self-training is to ensure that the remote pilot demonstrate at all times the ability to:
- (1) operate a class C2 UAS within its limitations;
 - (2) complete all manoeuvres with smoothness and accuracy;

- (3) exercise good judgment and airmanship;
 - (4) apply their theoretical knowledge; and
 - (5) maintain control of the UA at all times in such a manner that the successful outcome of a procedure or manoeuvre is never seriously in doubt.
- (b) The remote pilot should complete the practical-skills self-training with a UAS that features the same flight characteristics (e.g. fixed wing, rotorcraft), control scheme (manual or automated, human-machine interface) and a similar weight as the UAS intended for use in the UAS operation. This implies the use of a UA with an MTOM of less than 4 kg and bearing the Class 2 identification label.
- (c) If a UAS with both manual and automated control schemes is used, the practical-skills self-training should be done with both control schemes. If a UAS has multiple automated features, the remote pilot should demonstrate proficiency with each automated feature.
- (d) The practical-skills self-training should contain at least flying exercises regarding take-off or launch and landing or recovery, precision flight manoeuvres remaining in a given airspace volume, hovering in all orientations or loitering around positions when applicable. In addition, the remote pilot should follow the contingency procedures for abnormal situations (e.g. a return-to-home function, if available), as stipulated in the user's manual provided by the manufacturer. However, the remote pilot should only follow those contingency procedures that do not require the deactivation of the UAS functions that may reduce its safety level.

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

ED Decision 2022/002/R

PRACTICAL COMPETENCIES FOR THE PRACTICAL-SKILLS SELF-TRAINING

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

The following list of practical competencies should be considered:

- (a) Preparation of the UAS operation:
- (1) make sure that the:
 - (i) chosen payload is compatible with the UAS used for the UAS operation;
 - (ii) zone of UAS operation is suitable for the intended operation; and
 - (iii) UAS meets the technical requirements of the geographical zone;
 - (2) define the area of operation in which the intended operation takes place in accordance with [UAS.OPEN.040](#);
 - (3) define the area of operation considering the characteristics of the UAS;
 - (4) identify the limitations published by the MS for the geographical zone (e.g. no-fly zones, restricted zones and zones with specific conditions near the operation zone), and if needed, seek authorisation by the entity responsible for such zones;
 - (5) identify the goals of the UAS operation;
 - (6) identify any obstacles and the potential presence of uninvolved persons in the area of operation that could hinder the intended UAS operation; and

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- (7) check the current meteorological conditions and the forecast for the time planned for the operation.
 - (b) Preparation for the flight:
 - (1) assess the general condition of the UAS and ensure that the configuration of the UAS complies with the instructions provided by the manufacturer in the user's manual;
 - (2) ensure that all removable components of the UA are properly secured;
 - (3) make sure that the software installed on the UAS and on the remote pilot station (RPS) is the latest published by the UAS manufacturer;
 - (4) calibrate the instruments on board the UA, if needed;
 - (5) identify possible conditions that may jeopardise the intended UAS operation;
 - (6) check the status of the battery and make sure it is compatible with the intended UAS operation;
 - (7) activate the geo-awareness system and ensure that the geographical information is up to date;
 - (8) set the height limitation system, if needed;
 - (9) set the low-speed mode, if available; and
 - (10) check the correct functioning of the C2 link.
 - (c) Flight under normal conditions:
 - (1) following the procedures provided by the manufacturer in the user's manual, familiarise themselves with how to:
 - (i) take off (or launch);
 - (ii) make a stable flight:
 - (A) hover in case of multirotor UA;
 - (B) perform coordinated large turns;
 - (C) perform coordinated tight turns;
 - (D) perform straight flight at constant altitude;
 - (E) change direction, height and speed;
 - (F) follow a path;
 - (G) return of the UA towards the remote pilot after the UA has been placed at a distance that no longer allows its orientation to be distinguished, in case of multirotor UA;
 - (H) perform horizontal flight at different speeds (critical high speed or critical low speed), in case of fixed-wing UA;
 - (iii) keep the UA outside no-fly zones or restricted zones, unless holding an authorisation;
 - (iv) use some external references to assess the distance and height of the UA;
 - (v) perform a return-to-home (RTH) procedure — automatic or manual;

- (vi) land (or recover);
 - (vii) perform a landing procedure and a missed approach in case of fixed-wing UA; and
 - (vii) perform real-time monitoring of the status and endurance limitations of the UAS; and
- (2) maintain sufficient separation from obstacles.
- (d) Flight under abnormal conditions:
 - (i) manage the UAS flight path in abnormal situations;
 - (ii) manage the situation when the UAS positioning equipment is impaired (if the UAS used allows the deactivation of that equipment);
 - (iii) simulate the incursion of a person into the area of operation, and take appropriate measures to maintain safety;
 - (iv) manage the exit from the operation zone as defined during the flight preparation;
 - (v) simulate the incursion of a manned aircraft nearby the area of operation;
 - (vi) simulate the incursion of another UAS in the area of operation;
 - (vii) select the safeguard mechanism relevant to the situation;
 - (viii) resume manual control of the UAS when the use of automatic systems renders the situation dangerous; and
 - (ix) apply the recovery method following a deliberate (simulated) loss of the C2 link.
- (e) Briefing, debriefing and feedback:
 - (i) shut down the UAS and secure it;
 - (ii) carry out a post-flight inspection and record any relevant data on the general condition of the UAS (its systems, components, and power sources);
 - (iii) conduct a review of the UAS operation; and
 - (iv) identify situations where an occurrence report is necessary, and complete the occurrence report.

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

ED Decision 2019/021/R

ADDITIONAL THEORETICAL KNOWLEDGE OF SUBJECTS FOR THE EXAMINATION FOR SUBCATEGORY A2

- (a) By passing the additional theoretical knowledge examination, the remote pilot should demonstrate that they:
 - (1) understand the safety risks linked with a UAS operation in close proximity to uninvolved people or with a heavier UA;
 - (2) are able to assess the ground risk related to the environment where the operation takes place, as well as to flying in close proximity to uninvolved people;
 - (3) have a basic knowledge of how to plan a flight and define contingency procedures; and
 - (4) understand how weather conditions may affect the performance of the UA.

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- (b) The theoretical knowledge examination should cover aspects from the following subjects:
- (1) meteorology:
 - (i) the effect of weather on the UA:
 - (A) wind (e.g. urban effects, turbulence);
 - (B) temperature;
 - (C) visibility; and
 - (D) the density of the air;
 - (ii) obtaining weather forecasts;
 - (2) UAS flight performance:
 - (i) the typical operational envelope of a rotorcraft, for fixed wing and hybrid configurations;
 - (ii) mass and balance, and centre of gravity (CG):
 - (A) consider the overall balance when attaching gimbals, payloads;
 - (B) understand that payloads can have different characteristics, thus making a difference to the stability of a flight; and
 - (C) understand that each different type of UA has a different CG;
 - (iii) secure the payload;
 - (iv) batteries:
 - (A) understand the power source to help prevent potential unsafe conditions;
 - (B) familiarise with the existing different kinds of battery types;
 - (C) understand the terminology used for batteries (e.g. memory effect, capacity, c-rate); and
 - (D) understand how a battery functions (e.g. charging, usage, danger, storage); and
 - (3) technical and operational mitigations for ground risk:
 - (i) low-speed mode functions;
 - (ii) evaluating the distance from people; and
 - (iii) the 1:1 rule.

AMC2 UAS.OPEN.030(2)(c) UAS operations in subcategory A2 and Attachment A to Chapter I of Appendix 1 'Remote pilot theoretical knowledge and practical-skills examination for STS-01'

ED Decision 2022/002/R

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

The theoretical knowledge examination to obtain a 'certificate of remote pilot competency' in subcategory A2 of the 'open' category (according to point [UAS.OPEN.030\(2\)\(c\)](#)) and the 'certificate of remote pilot theoretical knowledge' for STSs (as per [Attachment A to Chapter I of Appendix 1](#) of the UAS Regulation) should be conducted:

- (1) as a face-to-face examination at the facilities of the competent authority, or of the entity that is designated by the competent authority (if that entity issues the certificate), or of the entity recognised by the competent authority (if the certificate is issued by the competent authority); or
- (2) through an online-proctored examination provided by the competent authority, or the entity that is designated by the competent authority (if that entity issues the certificate), or the entity recognised by the competent authority (if the certificate is issued by the competent authority). The examination provider should provide the participants in the exam with a clear procedure on how to conduct such an examination as well as with a system that:
 - (a) allows the adequate verification of the identity of the person that takes the examination;
 - (b) provides a method to verify that the person that takes the examination does not use during the examination support other than that specified in the examination procedure (e.g. computer traffic data lock and monitoring to prevent screen sharing, mirroring and remote desktop, video and room sound analysis).

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

ED Decision 2022/002/R

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

A remote pilot may obtain the additional theoretical knowledge that is needed to pass the additional theoretical examination for a certificate of remote pilot competency via competency-based training that covers aspects related to non-technical skills in an integrated manner, taking into account the particular risks associated with UAS operations. Competency-based training should be developed using the analysis, design, development, implementation, and evaluation (ADDIE) principles.

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

- (a) Self-study, such as:
 - (1) reading the manual or leaflet provided by the UA manufacturer;
 - (2) reading related information or watching instructional films; and
 - (3) obtaining information from others who have already experience in flying a UA.
- (b) Study in a training facility.

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

UAS.OPEN.040 UAS operations in subcategory A3

Regulation (EU) 2020/639

UAS operations in subcategory A3 shall comply with all of the following conditions:

- (1) be conducted in an area where the remote pilot reasonably expects that no uninvolved person will be endangered within the range where the unmanned aircraft is flown during the entire time of the UAS operation;
- (2) be conducted at a safe horizontal distance of at least 150 metres from residential, commercial, industrial or recreational areas;
- (3) be performed by a remote pilot who is familiar with manufacturer's instructions 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](#);
- (4) be performed with an unmanned aircraft that:
 - (a) has an MTOM, including payload, of less than 25 kg, in the case of a privately built UAS, or
 - (b) meets the requirements defined in point (b) of [Article 20](#);
 - (c) is marked as class C2 and complies with the requirements of that class, as defined in Part 3 of the Annex to Delegated Regulation (EU) 2019/945 and is operated with active and updated direct remote identification system and geo-awareness function or;
 - (d) is marked as class C3 and complies with the requirements of that class, as defined in Part 4 of the Annex to Delegated Regulation (EU) 2019/945 and is operated with active and updated direct remote identification system and geo-awareness function; or
 - (e) is marked as class C4 and complies with the requirements of that class, as defined in Part 5 of the Annex to Delegated Regulation (EU) 2019/945.

AMC1 UAS.OPEN.040(1) Operations in subcategory A3

ED Decision 2019/021/R

AREAS WHERE UAS OPERATIONS IN A3 MAY BE CONDUCTED

- (a) If an uninvolved person enters the range of the UAS operation, the remote pilot should, where necessary, adjust the operation to ensure the safety of the uninvolved person and discontinue the operation if the safety of the UAS operation is not ensured.
- (b) A minimum horizontal distance from the person that is passing the area could be estimated as follows:
 - (1) no less than 30 m;
 - (2) no less than the height ('1:1 rule', i.e. if the UA is flying at a height of 30 m, the distance of the UA from the uninvolved person should be at least 30 m), and

- (3) no less than the distance that the UA would cover in 2 seconds at the maximum speed (this assumes a reaction time of 2 seconds).

This minimum horizontal distance is intended to protect people on the ground, but can be extended to property and animals.

GM1 UAS.OPEN.030(1) and UAS.OPEN.040(1) UAS operations in subcategories A1 and A3

ED Decision 2019/021/R

DIFFERENCE BETWEEN SUB-CATEGORIES A2 AND A3

Subcategory A2 addresses operations during which flying close to people is intended for a significant portion of the flight. The minimum distance ranges from 30 m to 5 m from uninvolved people. 5 m is only allowed when there is an active low-speed mode function on the UA, and the remote pilot has conducted an evaluation of the situation regarding the weather, the performance of the UA and the segregation of the overflow area.

Sub-category A3 addresses operations that are conducted in an area (hereafter referred to as 'the area') where the remote pilot reasonably expects that no uninvolved people will be endangered within the range of the unmanned aircraft where it is flown during the mission. In addition, the operation must be conducted at a safe horizontal distance of at least 150 m from residential, commercial, industrial or recreational areas.

GM1 UAS.OPEN.040(4) UAS operations in subcategory A3

ED Decision 2022/002/R

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

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

- (a) a class C0 class identification label that complies with the requirements of [Part 1](#) of the Annex to Regulation (EU) 2019/945; or
- (b) a class C1 class identification label that complies with the requirements of [Part 1](#) of the Annex to Regulation (EU) 2019/945, as well as with an active and updated direct remote identification system and a geo-awareness function.

UAS.OPEN.050 Responsibilities of the UAS operator

Regulation (EU) 2020/639

The UAS operator shall comply with all of the following:

- (1) develop operational procedures adapted to the type of operation and the risk involved;
- (2) ensure that all operations effectively use and support the efficient use of radio spectrum in order to avoid harmful interference;
- (3) designate a remote pilot for each flight;

- (4) ensure that remote pilots and all other personnel performing a task in support of the operations are familiar with manufacturer's instructions provided by the manufacturer of the UAS, and:
 - (a) have appropriate competency in the subcategory of the intended UAS operations in accordance with points [UAS.OPEN.020](#), [UAS.OPEN.030](#) or [UAS.OPEN.040](#) to perform their tasks or, for personnel other than the remote pilot, have completed an on-the-job-training course developed by the operator;
 - (b) are fully familiar with the UAS operator's procedures;
 - (c) are provided with the information relevant to the intended UAS operation concerning any geographical zones published by the Member State of operation in accordance with [Article 15](#);
- (5) update the information into the geo-awareness system when applicable according to the intended location of operation;
- (6) in the case of an operation with an unmanned aircraft of one of the classes defined in Parts [1](#) to [5](#) of the Annex of Delegated Regulation (EU) 2019/945, ensure that the UAS is:
 - (a) accompanied by the corresponding EU declaration of conformity, including the reference to the appropriate class; and
 - (b) the related class identification label is affixed to the unmanned aircraft.
- (7) Ensure in the case of an UAS operation in subcategory A2 or A3, that all involved persons present in the area of the operation have been informed of the risks and have explicitly agreed to participate.

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

ED Decision 2022/002/R

OPERATIONAL PROCEDURES

The UAS operator should develop procedures adapted to the type of operations they intend to perform and to the risks involved. Therefore, written procedures should not be necessary if the UAS operator is also the remote pilot, and the remote pilot may use the procedures defined in the manufacturer's instructions.

If a UAS operator employs more than one remote pilot, the UAS operator should:

- (a) develop procedures for UAS operations in order to coordinate the activities between its employees; and
- (b) establish and maintain a list of their personnel and their assigned duties.

GM1 UAS.OPEN.050(3) Responsibilities of the UAS operator

ED Decision 2022/002/R

OPERATIONAL PROCEDURES

The UAS operator must identify a remote pilot for each flight. For UAS operations in the 'open' category, it is forbidden to hand the control of the UA over to another command unit during the flight.

AMC1 UAS.OPEN.050(4)(c) Responsibilities of the UAS operator

ED Decision 2019/021/R

OBTAIN UPDATED INFORMATION ABOUT THE GEOGRAPHICAL ZONE

The UAS operator should download the latest version of the geographical data and make available to the remote pilot such that they can upload it onto the geo-awareness system, if such a system is available on the UA used for the operation.

UAS.OPEN.060 Responsibilities of the remote pilot

Commission Implementing Regulation (EU) 2021/1166

- (1) Before starting an UAS operation, the remote pilot shall:
 - (a) have the appropriate competency in the subcategory of the intended UAS operations in accordance with points [UAS.OPEN.020](#), [UAS.OPEN.030](#) or [UAS.OPEN.040](#) to perform its task and carry a proof of competency while operating the UAS, except when operating an unmanned aircraft referred to in points (5)(a), (5)(b) or (5)(c) of point [UAS.OPEN.020](#);
 - (b) obtain updated information relevant to the intended UAS operation about any geographical zone published by the Member State of operation in accordance with [Article 15](#);
 - (c) observe the operating environment, check the presence of obstacles and, unless operating in subcategory A1 with an unmanned aircraft referred to in points (5)(a), (5)(b) or (5)(c) of point [UAS.OPEN.020](#), check the presence of any uninvolved person;
 - (d) ensure that the UAS is in a condition to safely complete the intended flight, and if applicable, check if the direct remote identification is active and up-to-date;
 - (e) if the UAS is fitted with an additional payload, verify that its mass does not exceed neither the MTOM defined by the manufacturer or the MTOM limit of its class.
- (2) During the flight, the remote pilot shall:
 - (a) 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;
 - (b) 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 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;
 - (c) comply with the operational limitations in geographical zones defined in accordance with [Article 15](#);
 - (d) have the ability to maintain control of the unmanned aircraft, except in the case of a lost link or when operating a free-flight unmanned aircraft;
 - (e) operate the UAS in accordance with manufacturer's instructions provided by the manufacturer, including any applicable limitations;
 - (f) comply with the operator's procedures when available;
 - (g) when operating at night, ensure that a green flashing light on the unmanned aircraft is activated.

- (3) During the flight, remote pilots and UAS operators shall not fly close to or inside areas where an emergency response effort is ongoing unless they have permission to do so from the responsible emergency response services.
- (4) For the purposes of point (2)(b), remote pilots may be assisted by an unmanned aircraft observer. In such case, clear and effective communication shall be established between the remote pilot and the unmanned aircraft observer.

GM1 UAS.OPEN.060(1)(b) Responsibilities of the remote pilot

ED Decision 2019/021/R

OBTAINING UPDATED INFORMATION ABOUT ANY FLIGHT RESTRICTIONS OR CONDITIONS PUBLISHED BY THE MEMBER STATE

Information on airspace structure and limitations, including limited zones for UA or no-UA zones, will be provided by the MSs in accordance with Article 15 of the UAS Regulation.

AMC1 UAS.OPEN.060(1)(c) Responsibilities of the remote pilot

ED Decision 2019/021/R

OPERATING ENVIRONMENT

- (a) The remote pilot should observe the operating environment and check any conditions that might affect the UAS operation, such as the locations of people, property, vehicles, public roads, obstacles, aerodromes, critical infrastructure, and any other elements that may pose a risk to the safety of the UAS operation.
- (b) Familiarisation with the environment and obstacles should be conducted, when possible, by walking around the area where the operation is intended to be performed.
- (c) It should be verified that the weather conditions at the time when the operation starts and those that are expected for the entire period of the operation are compatible with those defined in the manufacturer's manual.
- (d) The remote pilot should be familiar with the operating environment and the light conditions, and make a reasonable effort to identify potential sources of electromagnetic energy, which may cause undesirable effects, such as electromagnetic interference (EMI) or physical damage to the operational equipment of the UAS.

AMC1 UAS.OPEN.060(1)(d) Responsibilities of the remote pilot

ED Decision 2019/021/R

UAS IN A SAFE CONDITION TO COMPLETE THE INTENDED FLIGHT

The remote pilot should:

- (a) update the UAS with data for the geo-awareness function if it is available on the UA;
- (b) ensure that the UAS is fit to fly and complies with the instructions and limitations provided by the manufacturer, or the best practice in the case of a privately built UAS;
- (c) ensure that any payload carried is properly secured and installed and that it respects the limits for the mass and CG of the UA;
- (d) ensure that the charge of the battery of the UA is enough for the intended operation based on:

- (1) the planned operation; and
- (2) the need for extra energy in case of unpredictable events; and
- (e) for UAS equipped with a loss-of-data-link recovery function, ensure that the recovery function allows a safe recovery of the UAS for the envisaged operation; for programmable loss-of-data-link recovery functions, the remote pilot may have to set up the parameters of this function to adapt it to the envisaged operation.

GM1 UAS.OPEN.060(2)(a) and UAS.SPEC.060(1)(a) Responsibilities of the remote pilot

ED Decision 2019/021/R

OTHER CAUSES

'Other causes' means any physical or mental disorder or any functional limitation of a sensory organ that would prevent the remote pilot from performing the operation safely.

AMC1 UAS.OPEN.060(2)(b) Responsibilities of the remote pilot

ED Decision 2019/021/R

VLOS RANGE

- (a) The maximum distance of the UA from the remote pilot should depend on the size of the UA and on the environmental characteristics of the area (such as the visibility, presence of tall obstacles, etc.).
- (b) The remote pilot should keep the UA at a distance such that they are always able to clearly see it and evaluate the distance of the UA from other obstacles. If the operation takes place in an area where there are no obstacles and the remote pilot has unobstructed visibility up to the horizon, the UA can be flown up to a distance such that the UA remain clearly visible. If there are obstacles, the distance should be reduced such that the remote pilot is able to evaluate the relative distance of the UA from that obstacle. Moreover, the UA should be kept low enough so that it is essentially 'shielded' by the obstacle, since manned aircraft normally fly higher than obstacles.

GM1 UAS.OPEN.060(2)(b) Responsibilities of the remote pilot

ED Decision 2019/021/R

DISCONTINUATION OF THE FLIGHT IF THE OPERATION POSES A RISK TO OTHER AIRCRAFT

The rules put an obligation on the remote pilot to maintain a thorough visual scan of the airspace to avoid any risk of a collision with manned aircraft. This means that the remote pilot is primarily responsible for avoiding collisions. The reason is that the manned aircraft pilot(s) may not be able to see the UA due to its small size. Therefore, the remote pilot should make an evaluation of the risk of collision and take appropriate action.

As soon as the remote pilot sees another aircraft or a parachute or any other airspace user, they must immediately keep the UA at a safe distance from it and land if the UA is on a trajectory towards the other object.

For example, if the remote pilot sees a manned aircraft flying at very high altitude (i.e. an en route flight at a height of 1 km or more), since the pilot will always keep the UA below 120 m, they can continue the operation.

If the remote pilot observes an aircraft passing through the sky at a low altitude, at which it may interact with the UA, they need to immediately reduce the height of the UA (e.g. to less than 10 m above the ground) and keep the UA in an area that is far (not less than 500 m) from the other aircraft. If they cannot ensure such a distance, the UA needs to be immediately landed.

AMC1 UAS.OPEN.060(2)(d) Responsibilities of the remote pilot

ED Decision 2019/021/R

ABILITY TO MAINTAIN CONTROL OF THE UA

- (a) The remote pilot should:
 - (1) be focused on the operation of the UA, as appropriate;
 - (2) not operate a UA while operating a moving vehicle; and
 - (3) operate only one UA at a time.
- (b) If the remote pilot operates a UA from a moving ground vehicle or boat, the speed of the vehicle should be slow enough for the remote pilot to maintain a VLOS of the UA, maintain control of the UA at all times and maintain situational awareness and orientation.

GM1 UAS.OPEN.060(2)(d) Responsibilities of the remote pilot

ED Decision 2019/021/R

ABILITY TO MAINTAIN CONTROL OF THE UA

Autonomous operations are not allowed in the 'open' category, and the remote pilot must be able to take control of the UA at any time, except in the event of a lost-link condition or a free-flight UA.

GM2 UAS.OPEN.060(2)(d) Responsibilities of the remote pilot

ED Decision 2019/021/R

FREE-FLIGHT UA

'Free flight' means performing flights with no external control, taking advantage of the ascending currents, dynamic winds and the performance of the model. Outdoor free flights are carried out with gliders or with models equipped with means of propulsion (e.g. rubber-bands, thermal engines) that raise them in altitude, before they freely glide and follow the air masses.

GM1 UAS.OPEN.060(3) and UAS.SPEC.060(3)(e) Responsibilities of the remote pilot

ED Decision 2019/021/R

EMERGENCY RESPONSE DEFINITION

'Emergency response' is an action taken in response to an unexpected and dangerous event in an attempt to mitigate its impact on people, property or the environment.

GM2 UAS.OPEN.060(3) and UAS.SPEC.060(3)(e) Responsibilities of the remote pilot

ED Decision 2019/021/R

EMERGENCY RESPONSE EFFORT

When there is an emergency response effort taking place in the operational area of a UAS, the UAS operation should be immediately discontinued unless it was explicitly authorised by the responsible emergency response services. Otherwise, a safe distance must be maintained between the UA and the emergency response site so that the UA does not interfere with, or endanger, the activities of the emergency response services. The UAS operator should take particular care to not hinder possible aerial support and to protect the privacy rights of persons involved in the emergency event.

GM1 UAS.OPEN.060(4) Responsibilities of the remote pilot

ED Decision 2019/021/R

ROLE OF THE UA OBSERVER AND FIRST PERSON VIEW

The remote pilot may be assisted by a UA observer helping them to keep the UA away from obstacles. The UA observer must be situated alongside the remote pilot in order to provide warnings to the remote pilot by supporting them in maintaining the required separation between the UA and any obstacle, including other air traffic.

UA observers may also be used when the remote pilot conducts UAS operations in first-person view (FPV), which is a method used to control the UA with the aid of a visual system connected to the camera of the UA. In any case, including during FPV operations, the remote pilot is still responsible for the safety of the flight.

As the UA observer is situated alongside the remote pilot and they must not use aided vision (e.g. binoculars), their purpose is not to extend the range of the UA beyond the VLOS distance from the remote pilot. Exceptions are emergency situations, for instance, if the pilot must perform an emergency landing far from the pilot's position, and binoculars can assist the pilot in safely performing such a landing.

UAS.OPEN.070 Duration and validity of the remote pilot online theoretical competency and certificates of remote pilot competency

Regulation (EU) 2020/639

- (1) The remote pilot online theoretical competency, required by points (4)(b) of point [UAS.OPEN.020](#) and point (3) of point [UAS.OPEN.040](#), and the certificate of remote pilot competency, required by point (2) of point [UAS.OPEN.030](#), shall be valid for five years.
- (2) The revalidation of the remote pilot online theoretical competency and of the certificate of remote pilot competency is, within its validity period, subject to:
 - (a) demonstration of competencies respectively in accordance with point (4)(b) of point [UAS.OPEN.020](#) or point (2) of point [UAS.OPEN.030](#); or
 - (b) the completion of a refresher training addressing respectively the theoretical knowledge subjects as defined in point (4)(b) of point [UAS.OPEN.020](#) or point (2) of point

[UAS.OPEN.030](#) provided by the competent authority or by an entity designated by the competent authority.

- (3) In order to revalidate the remote pilot online theoretical competency or the certificate of remote pilot competency upon its expiration, the remote pilot shall comply with point (2)(a).

PART B — UAS OPERATIONS IN THE 'SPECIFIC' CATEGORY

UAS.SPEC.010 General provisions

Regulation (EU) 2020/639

The UAS operator shall provide the competent authority with an operational risk assessment for the intended operation in accordance with [Article 11](#), or submit a declaration when point [UAS.SPEC.020](#) is applicable, unless the operator holds a light UAS operator certificate (LUC) with the appropriate privileges, in accordance with Part C of this Annex. The UAS operator shall regularly evaluate the adequacy of the mitigation measures taken and update them where necessary.

UAS.SPEC.020 Operational declaration

Regulation (EU) 2020/639

- (1) In accordance with [Article 5](#), the UAS operator may submit an operational declaration of compliance with a standard scenario as defined in [Appendix 1](#) to this Annex to the competent authority of the Member State of registration as an alternative to points [UAS.SPEC.030](#) and [UAS.SPEC.040](#) in relation to operations:
 - (a) of unmanned aircraft with:
 - (i) maximum characteristic dimension up to 3 metres in VLOS over controlled ground area except over assemblies of people,
 - (ii) maximum characteristic dimension up to 1 metre in VLOS except over assemblies of people;
 - (iii) maximum characteristic dimension up to 1 metre in BVLOS over sparsely populated areas;
 - (iv) maximum characteristic dimension up to 3 metres in BVLOS over controlled ground area.
 - (b) performed below 120 metres from the closest point of the surface of the earth, and:
 - (i) in uncontrolled airspace (class F or G) unless different limitations are provided by Member States through UAS geographical zones in areas where the probability of encountering manned aircraft is not low; or
 - (ii) in controlled airspace, in accordance with published procedures for the area of operation, so that a low probability of encountering manned aircraft is ensured.
- (2) A declaration of UAS operators shall contain:
 - (a) administrative information about the UAS operator;
 - (b) a statement that the operation satisfies the operational requirement set out in point (1) and a standard scenario as defined in [Appendix 1](#) to the Annex;
 - (c) the commitment of the UAS operator to comply with the relevant mitigation measures required for the safety of the operation, including the associated instructions for the operation, for the design of the unmanned aircraft and the competency of involved personnel.

- (d) confirmation by the UAS operator that an appropriate insurance cover will be in place for every flight made under the declaration, if required by Union or national law.
- (3) Upon receipt of the declaration, the competent authority shall verify that the declaration contains all the elements listed in point (2) and shall provide the UAS operator with a confirmation of receipt and completeness without undue delay.
- (4) After receiving the confirmation of receipt and completeness, the UAS operator is entitled to start the operation.
- (5) UAS operators shall notify, without any delay, the competent authority of any change to the information contained in the operational declaration that they submitted.
- (6) UAS operators holding an LUC with appropriate privileges, in accordance with Part C of this Annex, are not required to submit the declaration.

UAS.SPEC.030 Application for an operational authorisation

Regulation (EU) 2020/639

- (1) Before starting an UAS operation in the 'specific' category the UAS operator shall obtain an operational authorisation from the national competent authority of the Member State of registration, except:
 - (a) when point [UAS.SPEC.020](#) is applicable; or
 - (b) the UAS operator holds an LUC with the appropriate privileges, in accordance with Part C of this Annex.
- (2) The UAS operator shall submit an application for an updated operational authorisation if there are any significant changes to the operation or to the mitigation measures listed in the operational authorisation.
- (3) The application for an operational authorisation shall be based on the risk assessment referred to in [Article 11](#) and shall include in addition the following information:
 - (a) the registration number of the UAS operator;
 - (b) the name of the accountable manager or the name of the UAS operator in the case of a natural person;
 - (c) the operational risk assessment;
 - (d) the list of mitigation measures proposed by the UAS operator, with sufficient information for the competent authority to assess the adequacy of the mitigation means to address the risks;
 - (e) an operations manual when required by the risk and complexity of the operation;
 - (f) a confirmation that an appropriate insurance cover will be in place at the start of the UAS operations, if required by Union or national law.

AMC1 UAS.SPEC.030(2) Application for an operational authorisation — EASA Form 208

ED Decision 2025/018/R

APPLICATION FORM FOR AN OPERATIONAL AUTHORISATION

The UAS operator should submit an application for an operational authorisation according to the following form. The application and all the documentation referred to or attached to the application should be stored for at least 2 years after the expiry of the related operational authorisation or submission of application in case of refusal. The UAS operator should ensure the protection of the stored data from unauthorised access, damage, alteration, and theft. The declaration may be complemented by the description of the procedures to ensure that all operations are in compliance with [Regulation \(EU\) 2016/679](#) on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, as required by point [UAS.SPEC.050 \(1\)\(a\)\(iv\)](#) of the UAS Regulation.

	Application for an operational authorisation for the 'specific' category	
Data protection: Personal data included in this application is processed by the competent authority pursuant to Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation). Personal data will be processed for the purpose of the performance, management and follow-up of the application by the competent authority in accordance with Article 12 of Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft. If the applicant requires further information concerning the processing of their personal data or exercising their rights (e.g. to access or rectify any inaccurate or incomplete data), they should refer to the point of contact of their competent authority. The applicant has the right to file a complaint regarding the processing of their personal data at any time to the national data protection supervisory authority.		
☐ New application	☐ Amendment to operational authorisation NNN-OAT-xxxxx/yyy	
1. UAS operator data		
1.1 UAS operator registration number		
1.2 UAS operator name		
1.3 Name of the accountable manager		
1.3 Operational point of contact Name Telephone Email		

2. Details of the UAS operation			
2.1 Expected date of start of the operation	DD/MM/YYYY	2.2 Expected end date	DD/MM/YYYY
2.3 Risk assessment reference and revision	☐ SORA edition date __ ☐ PDRA # __-__ edition date ☐ other _____		
2.4. Type of operation	☐ VLOS ☐ BVLOS		
2.5 Transport of dangerous goods	☐ Yes ☐ No		
2.6 Dropping material	☐ Yes ☐ No		
2.7 What is the minimum RP:UA ratio allowed between the remote pilot (RP) and the UA that may be operated simultaneously?	RP:UA ____:____		
2.8 Operations manual reference			
2.9 Compliance matrix file reference			
3. UAS data			
3.1 Design organisation name		3.2 Model name	
3.3 Type of UAS	☐ Fixed wing ☐ Rotorcraft-helicopter ☐ Rotorcraft-gyroplane ☐ VTOL-capable aircraft (VCA) (including multirotors) ☐ Lighter than air / other	3.4 Maximum UA characteristic dimensions	_____ m
3.5 Take-off mass	_____ kg	3.6 Maximum speed	_____ m/s (_____ kt)
3.7 Type of C2 link			
3.8 Size of the adjacent ground area	_____ km		
3.9 Is the UAS tethered during the operation?	☐ Yes ☐ No		
3.10 Type of propulsion system	☐ Electric ☐ Combustion ☐ Hybrid, specify type: _____ ☐ Other, please specify: _____		

3.11 Serial number or, if applicable, UA registration mark	
3.12 Type certificate (TC) or design verification report, if applicable	
3.13 Number of the certificate of airworthiness (CofA), if applicable	
3.14 Number of the noise certificate, if applicable	
3.15 E-conspicuity system	☐ Direct remote ID ☐ Network remote ID ☐ SRD-860 In ☐ SRD-860 Out ☐ ADS-B In ☐ ADS-B Out ☐ Other _____
3.16 Green flashing light	☐ Yes ☐ No
☐ I, the UAS operator, declare that: — the UAS operation complies with any applicable Union and national regulations related to privacy, data protection, liability, insurance, security, and environmental protection; — I have developed procedures to ensure that the intended UAS operation complies with the security requirements applicable to the area(s) of operation; — I have developed measures to protect against unlawful interference and unauthorised access; — I have developed procedures to ensure that all flights comply with Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data; — I have developed procedures for the remote pilot(s) to plan UAS operations in a manner that minimises nuisance, including noise- and other emissions-related nuisance, to people and animals; — I have records of: — all relevant qualifications and training courses completed by the remote pilot(s) and other personnel in charge of duties essential to the UAS operation and by maintenance staff, for at least 3 years after those persons have ceased employment with the organisation or have changed their position within the organisation; — the maintenance activities carried out on the UAS for a minimum of 3 years; — the information on UAS operations, including any unusual technical or operational occurrences and other data as required by the declaration or by the operational authorisation for a minimum of 3 years; — an up-to-date list of designated remote pilots-in-command for each flight, and if applicable, for each phase of flight; — an up-to-date list of maintenance staff employed to carry out maintenance activities; — the insurance coverage, if applicable, will be in place at the expected date of start of the UAS operation	

Section 4 – Specific operations risk assessment (SORA)			
Step #1 — Documentation of the proposed operation			
Step #1.1 Description of proposed locations	— If location-specific: Give reference to the file: _____ — If location-independent: (generic authorisation) Give reference to the file as example of a location: _____		
Step #1.2 Short description of the proposed operation			
Step #1.3 Dimensions of the operational volume and the adjacent volume (Rounded up to first decimal place)	Maximum height of the flight geography	HFGmax	_____ m
	Maximum height of the contingency volume	HCVmax	_____ m
	Width of the contingency volume	SCVmax	_____ m
	Width of the ground risk buffer	SGRBmax	_____ m
	Width of the adjacent volume	SAV	_____ m
Step #2 — UAS intrinsic ground risk class (iGRC)			
Step #2.1 Type of operational areas or maximum population density on the ground (including flight geography, contingency volume and ground risk buffer)	☐ controlled ground area people/km2 ☐ sparsely populated area ☐ up to 5 ☐ up to 50 ☐ up to 500 ☐ populated area ☐ up to 5 000 ☐ up to 50 000 ☐ more than 50 000 ☐ assemblies of people ☐ no limit		
Step #2.2 Specify the intrinsic ground risk class (iGRC)			
Step #2.3 Remarks/Reasoning for Step #2 (optional)			

Step #3 — Final ground risk class (GRC) determination (optional)							
Step #3.1 Specify the ground risk mitigations applied and the level of robustness (if applicable)	M1(A) Strategic mitigation — sheltering ☐ None ☐ Low ☐ Medium						
	M1(B) Strategic mitigation — operational restrictions ☐ None ☐ Medium ☐ High						
	M1(C) Tactical mitigation — ground observation ☐ None ☐ Low						
	M2 Effects of UA impact dynamics are reduced ☐ None ☐ Medium ☐ High						
Step #3.2 Specify the final ground risk class (GRC)							
Step #3.2 Remarks/Reasoning for Step #3 (optional)							
Step #4 — Initial air risk class (ARC)							
Step #4.1 Classification of the airspace where the operation is intended to be conducted (multiple answers possible)	☐ A	☐ B	☐ C	☐ D	☐ E	☐ F	☐ G
	☐ Restricted area				☐ Danger area		
	☐ TMZ ☐ RMZ ☐ ATZ ☐ CTR ☐ CTA ☐ FIZ						
Step 4.2 Specify the initial air risk class (ARC) of the operational volume	☐ ARC-a ☐ ARC-b ☐ ARC-c ☐ ARC-d						
Step #4.3 Remarks/Reasoning for choosing the ARC in Step #4							
Step #5 — Strategic air risk mitigations and final air risk class (ARC)							
Step #5.1 Specify the strategic mitigations of the air risk class, if applied	☐ No			☐ VLOS			
				☐ BVLOS with AOs ☐ Operational restrictions ☐ Common rules and structures			
Step #5.2 Residual air risk class	☐ ARC-a ☐ ARC-b ☐ ARC-c ☐ ARC-d						

(after strategic mitigation)	
Step #5.3 Remarks/Reasoning for Step #5 (not needed if no mitigation applied)	
Step #6 — Tactical mitigation performance requirements (TMPRs) and robustness level	
Step #6 Tactical mitigation performance requirements (TMPRs)	☐ No requirement (VLOS / BVLOS with AOs) ☐ BVLOS ☐ No requirement (ARC-a) ☐ Low (ARC-b) ☐ Medium (ARC-c) ☐ High (ARC-d)
Step #6.1 Remarks/Reasoning for Step #6 (optional)	
Step #7 — SAIL determination	
Step #7.1 Specific assurance and integrity level (SAIL)	☐ SAIL I ☐ SAIL II ☐ SAIL III ☐ SAIL IV ☐ SAIL V ☐ SAIL VI
Step #8 — Determination of containment requirements	
Step #8.1 Containment	☐ Low ☐ Medium ☐ High ☐ Tethered
Step #8.2 Assembly of people within 1 km of the operational volume?	☐ No ☐ Yes
Step #8.2 Remarks/Reasoning for Step #8 (optional)	
Step #9 — Identification of operational safety objectives (OSOs)	
Step #9.1 Operational safety objectives	
5. Remarks	
Date DD/MM/YYYY	Signature and stamp

Instructions for filling in the application form

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

Section 1

- 1.1 UAS operator registration number in accordance with [Article 14](#) of the UAS Regulation.
- 1.2 UAS operator's name as declared during the registration process.
- 1.3 Contact details of the person responsible for the operation, in charge to answer possible operational questions raised by the competent authority.

Section 2

- 2.2 Date on which the UAS operator expects to end the operation. The UAS operator may ask for an unlimited duration; in this case, indicate 'Unlimited'.
- 2.3 Select one of the three options. If the SORA is used, indicate the edition date as defined in [AMC1 Article 11](#). In case a PDRA is used, indicate the number and its edition date as defined in the applicable AMC to Article 11. In case a risk assessment methodology is used other than the SORA, provide its reference. In this last case, the UAS operator should demonstrate that the methodology complies with [Article 11](#) of the UAS Regulation. In case a PDRA is used, then section 4 of this form is not required to be completed.
- 2.7 If the UAS flight manual provided by the UAS designer indicates that it is designed with a level of automation that reduces the remote pilot's workload allowing one remote pilot (RP) to control multiple UA simultaneously, then specify the number of UA that one remote pilot is permitted to control (e.g. in case one RP is able to control simultaneously five UA, indicate RP:UA 1:5). This number should not exceed the limit defined in the UAS flight manual. Additionally, the UAS operator may decide to have a pool of remote pilots controlling multiple UA simultaneously. In this case, clear procedures should be developed to define who is the pilot-in-command, responsible during each phase of the flight (e.g. in case three RPs are permitted to control simultaneously ten UA, indicate RP:UA 3:10).
- 2.8 Indicate the OM's identification and revision number.
- 2.9 Indicate the compliance matrix file identification and revision number (e.g. the compliance matrix defined in Chapter A.4 of [Annex A to AMC1 Article 11](#) (SORA). This document should be attached to the application.

Section 3

This section may be replicated for all authorised UAS models to be used under this operational authorisation.

- 3.2 Model of the UAS as defined by the design organisation in the UAS flight manual.
- 3.3 Fixed-wing UA includes configurations such as aeroplanes, kites, gliders, etc.).
 - Rotorcraft-helicopter UA includes all vertical-lift configurations having up to 2 rotors.
 - Rotorcraft-gyroplane UA is a special configuration with unpowered rotor.
 - VTOL-capable aircraft (VCA) UA includes vertical-lift configurations with 3 or more rotors and fixed-wing UA capable of vertically taking off and landing.

Lighter-than-air configurations include configurations such as airships, hot-air balloons, etc.

- 3.4 Indicate the maximum dimensions of the UA in metres (refer to definition I.141 'UA characteristic dimension' in [Annex I of AMC1 Article 11](#) (SORA)).
- 3.5 Indicate the maximum value of the UA take-off mass (TOM), expressed in kg, at which the UA may be operated. All flights should be conducted without exceeding the specified TOM. The TOM may be different from (however, not exceeding) the MTOM defined by the UAS design organisation in the UAS flight manual.
- 3.6 Maximum operational airspeed, expressed in m/s and kt in parentheses, that the remote pilot will not exceed during the operation. This should always be lower than the maximum defined in the UAS flight manual.
- 3.7 Indicate the type of C2 link to be used during the operation (e.g. radio link, LTE/5G, satellite, etc.).
- 3.8 indicate the size in km to be considered for the adjacent ground area starting from the limits of the ground risk buffer, using the instructions defined in Section S.4.8.4 of [AMC1 Article 11](#) (SORA).
- 3.11 This field is mandatory if the UA is registered according to Article 14(7) of Implementing Regulation (EU) 2019/947. If the UA is not registered, the NAA may indicate the unique serial number (SN) of the UA defined by the design organisation according to standard ANSI/CTA-2063-A-2019, *Small Unmanned Aerial Systems Serial Numbers*, 2019. In case of privately built UAS or UAS not equipped with a unique SN, insert the unique SN of the remote identification system. For UAS operations classified in SAIL V or higher, the serial numbers of all UAS should be provided and any change to them would require the competent authority's prior approval. For UAS operations classified up to SAIL IV, a change to the serial number does not require a prior approval from the competent authority.
- 3.12 Include the EASA TC number, or the UAS design verification report (DVR) number issued by EASA, if applicable.
- 3.13 If a UAS with an EASA TC is required by the competent authority, the UAS should have a certificate of airworthiness (CofA).
- 3.14 If a UAS with an EASA TC is required by the competent authority, the UAS should have a noise certificate.
- 3.15 Multiple options are possible. Direct remote ID developed according to EN 4709-002.

In order to compile Section 4, please refer to [AMC1 Article 11](#) (SORA).

Section 4

Step #1.1:

The identification of the location(s) should contain the full operational volume and ground risk buffer (the red line in Figure 1; refer to [Annex A to AMC1 Article 11](#) for guidance and examples on the calculation of the operational volume and ground risk buffer). Depending on the initial ground and air risk classification determined using the SORA process and on the application of mitigations, the location(s) may be 'generic' or 'precise' (refer to [GM2 UAS.SPEC.030\(2\)](#)).

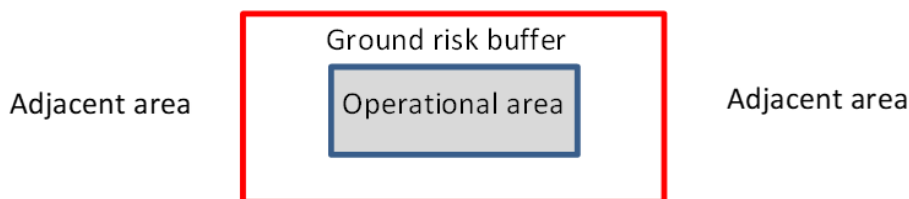


Figure 1 — Operational area and ground risk buffer

- Please, refer to [GM2 UAS.SPEC.030\(2\)](#) for guidance on the conditions to apply for 'generic' versus 'precise' locations.
- If location-specific: please, provide a list with the geo-coordinates for each location including the operational volume (flight geography and contingency volume), the ground risk buffer and the air risk buffer (if available) as a separate file using either '.txt', '.kmz' or '.kml'.
- If location-independent: please, provide a reference to the documented process for the determination of volumes and buffers and the assessment of the local conditions and their compliance limitations. An example of a geographical file (e.g. '.kmz' or '.kml') may be provided to show a typical operational volume, ground risk buffer and the air risk buffer (if available).

Step #1.2: Insert, for example, transport, inspection, filming, testing, etc.

Step #1.3: Please, provide a list with this information if location-specific with multiple locations.

Step #4.1: For information on the airspace classification, refer to Article 2 and to points SERA.6001 and SERA.6005 of Regulation (EU) No 923/2012.

Step #9.1: List the OSOs and the level of robustness you intend to comply with. The level of robustness should as a minimum reflect the one defined in Table 14 of Section S.4.9.3 of [AMC1 Article 11](#) considering the SAIL listed in point 'Step #7.1' of this form.

SECTION 5 Free-text field for the addition of any relevant remark.

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

AMC2 UAS.SPEC.030(2) Application for an operational authorisation

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SIGNIFICANT CHANGES TO THE OPERATIONAL AUTHORISATION

- (a) Any non-editorial change that affects the operational authorisation, or affects any associated documentation that is submitted to demonstrate compliance with the requirements established for the authorisation, should be considered to be a significant change.
- (b) With regard to the information and documentation associated with the authorisation, changes should be considered to be significant when they involve, for example:
 - (1) changes in the operations that affect the assumptions of the risk assessment;
 - (2) changes that relate to the management system of the UAS operator (including changes of key personnel), its ownership or its principal place of business;

- (3) non-editorial changes that affect the operational risk assessment report;
- (4) non-editorial changes that affect the policies and procedures of the UAS operator; and
- (5) non-editorial changes that affect the OM (when required).

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APPLICATION FORM FOR AN OPERATIONAL AUTHORISATION

Depending on the level of the risk of the operation, the technical characteristics of the UAS may play an important role in mitigating the risk. In that case, the UAS operator may provide additional information to the NAA on the characteristics of the UAS to be operated. The NAA will, in any case, ask for additional data when needed.

As an example regarding how to structure the additional information, the UAS operator may supplement the application for the authorisation with the additional elements shown below. Elements from the example may be added or removed as required.

LANDING GEAR		☐ yes ☐ no
Type	☐ Fixed ☐ Retractable ☐ Other	
Characteristics	☐ Wheels ☐ Skids ☐ Legs ☐ Other	
CONSPICUITY CHARACTERISTICS (2)		
Paint (1):		
Lights (2)	☐ yes ☐ no	Intensity:
Aircraft visibility lights:		
Control lights (flight mode or alert indicators, etc.):		
PROPULSION (3)		
☐ Electrical ☐ Combustion ☐ Hybrid ☐ Other		
Description:		
Note: Provide a brief description (for example, push/pull systems, coaxial systems in the case of multirotors, combined systems, etc.).		
SYSTEMS		
☐ Propellers ☐ Turbines ☐ Other		
Description:		
Control and/or positioning system (4)		
FLIGHT CONTROLLER (5)		
Manufacturer: Model:		
Description:		
FLIGHT TERMINATION SYSTEM (6)		
Description:		
FLIGHT MODES (7)		

Description:	
GROUND CONTROL STATION (8)	
Radio emitter: Manufacturer: Model:	
Mobile/computer application: Manufacturer: Model:	
Other: Manufacturer: Model:	
CONTROL COMMUNICATION LINK	
Description (frequency):	
TELEMETRY COMMUNICATION LINK	☐ yes ☐ no
Description (frequency):	
VIDEO SYSTEM COMMUNICATION LINK (FPV)	☐ yes ☐ no
Description (frequency):	
PAYLOAD COMMUNICATION LINK	☐ yes ☐ no
Description (frequency):	
PAYLOAD (9)	☐ yes ☐ no
TYPE	
☐ Fixed ☐ Interchangeable	
Description:	
OPERATION LIMITS (10)	
Maximum operating height:	
Max airspeed:	
Weather conditions:	
SAFETY SYSTEMS/SAFETY NETS AND AWARENESS (11)	
DETECT AND AVOID ☐ yes ☐ no	
Description:	
GEO-FENCING OR GEO-CAGING ☐ yes ☐ no	
Description:	
TRANSPONDER ☐ yes ☐ no	
Description:	
SYSTEMS FOR LIMITING IMPACT ENERGY ☐ yes ☐ no	
Description:	
OTHER	
Description:	

(1) PAINT

Describe any painted elements that are visible (marks) and significant (colour, shape, etc.).

(2) LIGHTS

Describe the lights, including their colours and locations.

(3) PROPULSION

Mark the type of propulsion used, indicating (in the space provided) the manufacturer and model, and detailing relevant information such as the number of motors/engines, the configuration, etc. Powerplant design diagrams may be attached if necessary.

(4) CONTROL AND/OR POSITIONING SYSTEM

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

(5) FLIGHT CONTROLLER

Indicate the manufacturer and model of the flight controller. Describe the relevant aspects affecting flight safety.

(6) FLIGHT TERMINATION SYSTEM

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

(7) FLIGHT MODES

Describe the flight modes (i.e. manual, artificial stability with controller, automatic, autonomous). For each flight mode, describe the variable that controls the aircraft: increments in position, speed control, attitude control, type of altitude control (which sensor is used for this purpose), etc.

(8) GROUND CONTROL STATION

For 'encrypted' links, describe the encryption system used, if any.

(9) PAYLOAD

Describe each of the different payload configurations that affect the mission or that, without changing it, impact the weight and balance, the electrical charge or the flight dynamics. Include all relevant technical details. If needed, you may use other documents that provide the specified details.

(10) OPERATION LIMITS

Describe in this section the maximum operating height, the maximum airspeed (including V_{max} ascent, V_{max} descent and V_{max} horizontal), and, in addition, the meteorological limit conditions in which the UAS can operate (e.g. rain, maximum wind, etc.)

(11) SAFETY SYSTEMS/SAFETY NETS AND AWARENESS

Describe the systems or equipment installed on the aircraft to mitigate potential operational safety risks, whether included in the form or not.

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'GENERIC' VERSUS 'PRECISE' OPERATIONAL AUTHORISATION

According to [Article 12](#) of the UAS Regulation, a competent authority may decide to grant a 'generic' operational authorisation, i.e. an operational authorisation that is applicable to an indefinite number of flights taking place in locations generically identified, during the period of validity of the operational authorisation. (Contrary to the 'generic' operational authorisation, an operational authorisation that is limited to the number of flights and/or to known locations identified by geographical coordinates will be called 'precise' operational authorisation.)

CONDITIONS FOR ISSUING A 'GENERIC' OPERATIONAL AUTHORISATION

A 'generic' operational authorisation does not contain any precise location (geographical coordinates) but applies to all locations that meet the approved conditions/limitations (e.g. density of population of the operational and adjacent area, class of airspace of the operational and adjacent area, maximum height, etc.). The UAS operator is responsible for checking that each flight they conduct:

- meets the mitigations and operational safety objectives derived from the SORA and the requirements listed in the operational authorisation; and
- takes place in an area whose characteristics and local conditions are consistent with the GRC and ARC classification of the SORA as approved by the NAA.

The UAS operator should anyhow check whether their MS has published a geographical zone in the area of operation according to [Article 15](#) of the UAS Regulation, requiring a flight authorisation (e.g. this may be the case for the areas covered by U-Space). A flight authorisation should not be confused with an operational authorisation.

The criteria to determine whether a UAS operator is eligible for a 'generic' operational authorisation are the following:

1. The limitations regarding the operational scenario, the operational volume and the buffers defined by the operational authorisation are expressed in such a way that it is simple for the UAS operator to ensure compliance with those limitations.

It will usually be easier for the UAS operator to ensure compliance when the conditions are unambiguous and not open to interpretation. This is the case, for instance, when:

- a controlled ground area is required, or the density of population is very low;
- the operation takes place in segregated airspace.

In this regard, 'generic' operational authorisations may be relevant for operations conducted according to PDRA-Sxx, since the conditions are similar to the ones of the declarative STS and it is relatively easy for the UAS operator to ensure compliance with those conditions.

As a rule of thumb, a 'precise' operational authorisation rather than a 'generic' one may be more appropriate when the iGRC ≥ 4 or the iARC $\geq$ ARC-c.

2. The strategic mitigation measures, if any, are not open to interpretation or difficult to implement.

The use of some strategic measure mitigation (M1 for GRC or Step 5 for ARC) often prompt debate between the UAS operator and the NAA regarding the relevance/validity of the data sources (density of population, density/type of traffic in given airspace, etc.), and the efficiency of the proposed strategic mitigation measures. Furthermore, some of these measures are difficult to implement and it is not always possible for the NAA to simply trust the capacity of the UAS operator to do so.

For instance, the following examples show measures that are difficult to implement / open to interpretation:

- achieving a local reduction of the density of population;
- ensuring the absence of uninvolved persons in very large, controlled ground areas, or reserving large, controlled ground areas in densely populated environments;
- starting an operation in airspace that requires a new protocol with the ANSP/ATSP, etc.

Note: In the future, qualified service for strategic deconfliction (U-space) may be a valid mitigation measure for a 'generic' operational authorisation.

3. The NAA has assessed the capacity of the UAS operator to identify/assess the local conditions

The UAS operator should have a diligent and documented process to identify/assess the local conditions and their compliance to the limitations given by the authorisation (in the operations manual (OM)). The UAS operator should train its personnel to assess the operational volume, buffers and mitigations in order to prepare for the next operations. The UAS operator should also document and record the assessment of locations (e.g. in mission files), so that adherence to this process can be verified by the NAA on a regular basis.

For simple operations where Criteria 1 and 2 are met, the NAA may decide to issue the 'generic' operational authorisation first and assess the robustness of the procedures through continuous oversight.

For complex operations where Criteria 1 and 2 are not met, then the third criterion is paramount. While the NAA may be confident enough to directly issue a 'generic' operational authorisation, it may also decide to add some restrictions for the locations that are valid for the first one (or more) operations. The UAS operator should provide evidence to the NAA that the process defined in Criterion 3 has been followed, and the area and local conditions identified by the UAS operator comply with the authorisation. The NAA will review the evidence (as for a 'precise' authorisation) and confirm in written to the operator that their analysis is satisfactory.

Once the NAA has enough evidence or confidence that the UAS operator is able to complete the assessments on its own, the restrictions on the location may be withdrawn.

Eventually, a LUC may be appropriate to demonstrate this capacity (see below).

DIFFERENCES BETWEEN A 'GENERIC' OPERATIONAL AUTHORISATION AND A LUC

An operational authorisation where the locations are generically identified may to some extent be traced to some privileges granted to a LUC holder: the UAS operator can schedule new flights without receiving a new operational authorisation for each of them. However, a LUC offers more flexibility than a generic operational authorisation by allowing a UAS operator to have different level of privileges, including the possibility to start new types of operations or use previously non-validated types of UASs.

On the other hand, a 'generic' operational authorisation does not require the UAS operator to formally implement a management system. Such a management system would be disproportionate for low-risk operations (such as PDRA-Sxx) (see Criterion 2). However, the more requirements are derived from the SORA and the conditions of the operational authorisations are difficult to check and to comply with, the more robust and reliable the processes and the organisation of the UAS operator need to be to ensure the absence of deviation.

Eventually, a LUC becomes necessary when the risk of deviation from these procedures is high and when deviating from the validated conditions greatly increases the risk of the operation. The LUC management system will be needed to ensure compliance with the procedures of the UAS operator through an independent process.

In this regard, a LUC may be more relevant than a 'generic' operational authorisation in the following cases:

- for SAIL ≥ 4 operations (due to OSO#1 'Ensure the UAS operator is competent and/or proven' with a 'high' level of robustness); or
- for SAIL ≥ 3 operations, when strategic ground risk mitigation (M1) or strategic air risk mitigation (Step 5) is applied, to make sure that the applicant exhibits the right safety culture to perform a location risk assessment.

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OPERATIONS MANUAL

For all operations classified in the 'specific' category, the UAS operator should develop an OM structured according to Chapter A.3 of [Annex A of AMC1 Article 11](#).

The OM should be submitted to the competent authority for operations classified in SAIL III and higher. For operations classified in SAIL I or II, please refer to [AMC1 Article 12\(2\)\(a\)](#).

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

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OPERATIONAL PROCEDURES WITH 'MEDIUM' AND 'HIGH' LEVEL OF ROBUSTNESS

1. Scope of this AMC

- 1.1 This AMC addresses the criteria for the 'medium' and 'high' level of robustness of the operational procedures that are required under the OSO #08: *Operational procedures are defined, validated and adhered to*.

These criteria may be used to also address the criteria for the 'medium' and 'high' level of robustness of the operational procedures required in other sections of the SORA (e.g the mitigations for the ground risk defined in [Annex B to AMC1 Article 11](#) or for the air risk defined in [Annex D to Article 11](#)).

2. Criteria for the level of integrity

- 2.1. Criterion #1: Procedure definition

2.1.1. [Annex E to AMC1 Article 11](#) provides the minimum elements that the operational procedures need to appropriately cover for the UAS operations.

2.1.2. Chapter A.3 of [Annex A to AMC1 Article 11](#) provides an example of an operations manual structure and a table referencing each OM chapter with the OSOs the requirements refer to.

2.2. Criterion #2: Consideration of potential human error

Operational procedures should be developed to minimise human errors:

- (a) each of the tasks and the complete sequence of the tasks of a procedure should be intuitive, unambiguous, and clearly defined;
- (b) the tasks should be clearly assigned to the relevant roles and persons, ensuring a balanced workload; and
- (c) the procedures should adequately address fatigue and stress, considering, among other aspects, the following: duty times, regular breaks, rest periods, the applicable health and safety requirements in the operational environment, handover/takeover procedures, responsibilities, and workload.

2.3 Criterion #3: Emergency response plan (ERP)

For more information regarding the ERP procedure, the UAS operator should refer to [AMC3 UAS.SPEC.030\(3\)\(e\)](#).

3. Criteria for the level of assurance

3.1. The purpose of the validation process described in this AMC is to confirm whether the proposed operational procedures are complete and adequate to ensure the safe conduct of the intended UAS operations.

3.2. The validation process should include the following:

- (a) a review of the completeness of the procedures to ensure that:
 - (1) all elements that are indicated in points 2.1.1 and 2.1.2 have been addressed; and
 - (2) all relevant references have been considered, including but not limited to:
 - (i) the applicable regulations;
 - (ii) the requirements from the competent authority and/or other relevant authorities or entities;
 - (iii) the local requirements and conditions;
 - (iv) the available recommended practices for the intended type of UAS operations;
 - (v) the instructions from the UAS designer and of any other UAS equipment designer, if applicable;
 - (vi) the instructions and requirements from externally provided services that support the UAS operations, if applicable;
 - (vii) the results from previous experience, including tests and/or simulations as those indicated in point (c) and (d); and

- (viii) consensus-based voluntary industry standards;
- (b) an expert judgement to assess the adequacy of the procedures based on:
 - (1) the objective(s) of each procedure;
 - (2) relevant key performance parameters/indicators and/or benchmarking of options, if applicable;
 - (3) an assessment of the procedures' complexity in accordance with point 2.2; and
 - (4) an assessment of the effect of human factors on procedures in accordance with point 2.2;
- (c) a proof of the adequacy of the procedures through tests or practical exercise for phases of the UAS operation other than the UA flight, which involve the UAS and/or any external system that supports the operation;
- (d) a proof of the adequacy of the contingency and emergency procedures through:
 - (1) dedicated flight tests conducted in an area with reduced air and ground risk and/or representative subsystems tests; or
 - (2) simulation, provided it is proven valid for the intended purpose with positive results; or
 - (3) any other means acceptable to the competent authority that issues the authorisation;
- (e) if the option in point (d)(3) is selected, a substantiation of the suitability of those means for proving the adequacy of the procedures;
- (f) a record of proof of the adequacy of the procedures, including at least:
 - (1) the UAS operator's name and registration number;
 - (2) the date(s) and place(s) of tests or simulations;
 - (3) identification of the means used, e.g. for tests or simulations that use actual UASs: the type category, the name of the UAS designer, and the model and serial number of each UA used;
 - (4) a description of tests or simulations conducted, including their purpose, the expected results (including key performance parameters/indicators, where relevant), how they were conducted, the results obtained, and conclusions; and
 - (5) the signature of the person that is appointed by the UAS operator to conduct the tests or simulations;
- (g) for UAS operations that require a 'high' level of assurance, the procedures and the dedicated flight tests, simulations, or other means acceptable to the competent authority, which are indicated in point 3.2, validated by the competent authority that issues the authorisation or by an entity that is recognised by that competent authority.

3.3. The following conditions apply to the dedicated flight tests that are indicated in point 3.2(d)(1):

- (a) the configuration of the UAS hardware and software should be identified;
 - (b) the UAS operator should conduct the dedicated flight tests;
 - (c) if no simulations as the ones indicated in point 3.2(d)(2) are conducted, the dedicated flight tests should cover all the relevant aspects of the contingency and emergency procedures;
 - (d) for UAS operations that require a 'high' level of assurance, the dedicated flight tests that are performed to validate the procedures and checklists should cover the complete flight envelope or proven to be conservative;
 - (e) the UAS operator should conduct as many flight tests as agreed with the competent authority to prove the adequacy of the proposed procedures;
 - (f) the dedicated flight tests should be conducted in a safe environment (reducing the ground and air risks to the greatest extent possible), while ensuring the representativeness of the tests' results for the intended UAS operations; and
 - (g) the UAS operator should record the flight tests as part of the information to be recorded as per point [UAS.SPEC.050\(1\)\(g\)](#), e.g. in a logbook, as indicated in [AMC1 UAS.SPEC.050\(1\)\(g\)](#); such a record should include any potential issues identified.
- 3.4. The UAS operator should reduce the complexity of the procedures as much as possible.
- 3.4.1. The verification of the complexity of the procedures may include:
- (a) an expert judgement, as indicated in point 3.3(b); and
 - (b) a proof of the adequacy of the procedures, as indicated in point 3.3(c) and (d).
- 3.4.2. The UAS operator may adopt a method for the evaluation of the complexity of the procedures applied by the relevant personnel, i.e. the remote pilot and/or other personnel in charge of duties essential to the UAS operation. That method should be adequate for the evaluation of the workload that is required by the task(s) of each procedure.

For example, a suitable method for evaluating the workload of the remote pilot and/or other personnel in charge of duties essential to the UAS operation may be the 'Bedford Workload Scale', which was conceived as a qualitative and relatively simple methodology for rating the pilots' workload that is associated with the design of an aircraft's human-machine interface (HMI). However, this methodology is deemed to be adequately generic to be also applicable to the tasks associated with the operational procedures to be conducted by remote pilots and/or other personnel in charge of duties essential to the UAS operation.

Figure 1 depicts the Bedford Workload Scale adapted to operational procedures for UAS operations: 'pilot' is replaced by 'remote crew member' (i.e. the remote pilot or other personnel in charge of duties essential to the UAS operation), and 'pilot decision' is replaced by 'remote crew member performs a procedure task'. A procedure may include one or more tasks.

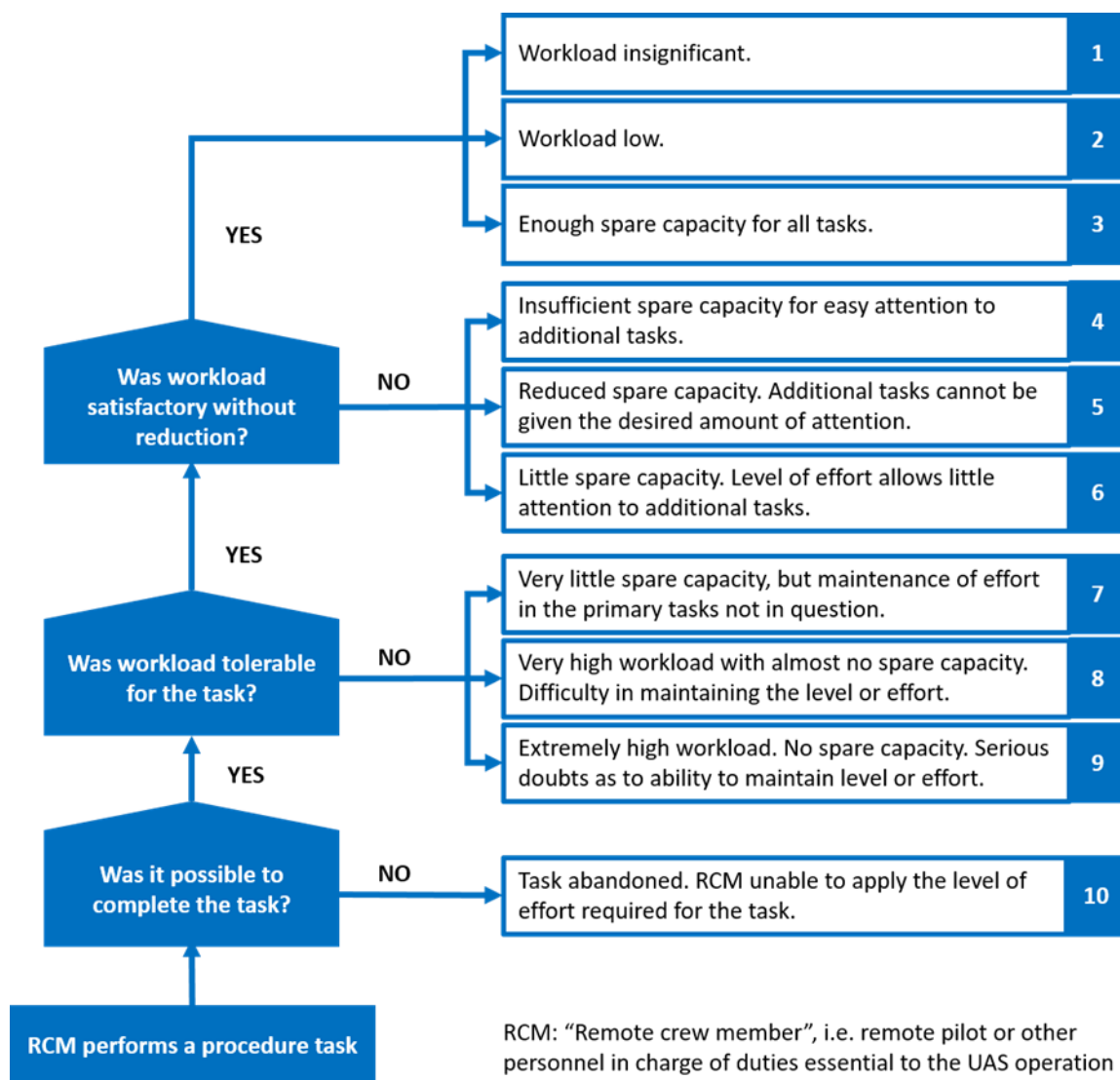


Figure 1 — Bedford Workload Scale adapted to operational procedures for UAS operations

AMC3 UAS.SPEC.030(3)(e) Application for an operational authorisation

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EMERGENCY RESPONSE PLAN (ERP)

1. Scope of this AMC

- 1.1 This AMC defines the content of an ERP as well as the methodology for its validation. It may be used to meet Criterion #4 of OSO #8 (ERP) of [Annex E to AMC1 Article 11](#).
- 1.2 The risk assessment, as required by [Article 11](#) of the UAS Regulation, should address the safety risks that are associated with the loss of control of a UAS operation, which may result in:

- (a) fatal injuries to third parties on the ground;
- (b) injuries to third parties in the air; or
- (c) damage to critical infrastructure.

Note: As per Section S.2.3.2 of [AMC1 Article 11](#), the loss of control of a UAS operation corresponds to situations where the contingency procedures would not have achieved the desired effect.

- 1.3. Therefore, in line with the risk assessment applied, the scope of this AMC is limited to addressing the response to emergency situations that are caused by the UAS operation, as well as the potential consequences that are indicated in point 1.2. However, the response to such emergency situations should not be limited to the potential risk/harm only to third parties but also to the UAS operator's personnel.
- 1.4. This AMC does not address emergency situations other than those referred to in point 1.3. However, the UAS operator may be required to address such situations as part of the operational authorisation¹.

2. Purpose of the ERP

- 2.1. The UAS operator should, in cooperation with other stakeholders, if applicable, develop, coordinate, and maintain an ERP that ensures orderly and safe transition from normal operation to emergency and return to normal operation. The ERP should include the actions to be taken by the UAS operator or specified individuals in an emergency, and indicate the size, nature, and complexity of the activities to be performed by the UAS operator or the specified individuals.
- 2.2. As for emergency procedures, an ERP is implemented by the UAS operator to address emergency situations. However, an ERP is specifically developed to:
 - (a) limit any escalating effect of the emergency situation;
 - (b) meet the conditions to alert the relevant authorities and entities.
- 2.3. The ERP should contain all the necessary information about the role of the relevant personnel in an emergency and about their response to it.

3. Effectiveness of the ERP

- 3.1. For the ERP to be effective, it should:
 - (a) be appropriate to the size, nature, and complexity of the UAS operation;
 - (b) be readily accessible by all relevant personnel and by other entities, where applicable;
 - (c) include procedures and checklists relevant to different or specific emergency situations;
 - (d) clearly define the roles and responsibilities of the relevant personnel;

¹ Chapter 2 *Events which may activate the Emergency Response Plan* of the European Helicopter Safety Team (EHST) *Safety Management Toolkit for Non-Complex Operators — Emergency Response Plan — A Template for Industry* (2nd edition, October 2014) provides examples of emergency situations that are outside the scope of this AMC but may be required to be addressed by the UAS operator as part of the operational authorisation (<https://www.easa.europa.eu/document-library/general-publications/ehst-safety-management-toolkit-non-complexoperators-2nd>).

- (e) have quick-reference contact details of the relevant personnel;
- (f) be regularly tested through practical exercises involving the relevant personnel; and
- (g) be periodically reviewed and updated, when necessary, to maintain its effectiveness.

4. Emergency situations, response activation, procedures, and checklists

- 4.1. The ERP should define the criteria for identifying emergency situations, and for identifying the main emergency situations that are likely to increase the level of harm (escalating effect) if no action is taken.
- 4.2. The identified emergency situations should at least include those where one or more UA are operated by the UAS operator and have the potential to:
 - (a) harm one or more persons;
 - (b) hit a ground vehicle, building, or facility where there are one or more persons who might be injured as a consequence of the UA impact;
 - (c) harm critical infrastructure;
 - (d) start a fire that might propagate;
 - (e) release dangerous substances;
 - (f) hit an aircraft that carries people and/or whose crash might lead to one or more of the situations listed in (a) to (e); and
 - (g) cause the UA to leave the operational volume and fly beyond the limits of:
 - (1) the ground risk buffer; and/or
 - (2) the air risk buffer (if existing), or enter adjacent airspace where there is a risk of collision with manned aircraft.
- 4.3. The ERP should establish the criteria for the activation of the respective emergency response procedures to address the identified emergency situations.
- 4.4. The ERP should consider the following principles for prioritising the actions to respond to an emergency situation:
 - (a) alert the relevant personnel and entities;
 - (b) protect the life of those affected or in danger;
 - (c) give first aid while awaiting the arrival of the emergency services, provided the personnel employed by the UAS operator is qualified for that purpose;
 - (d) ensure the safety of the emergency responders;
 - (e) address secondary effects and put in place actions to reduce them (e.g. if the UA crashes on a road, warn the other drivers in the traffic or redirect them accordingly in order to avoid having cars colliding with the crashed UAS);
 - (f) keep the emergency situation under control or contained;
 - (g) protect property;
 - (h) restore the normal situation as soon as practicable;

- (i) record the emergency situation and the response to it, and preserve evidence for further investigation;
 - (j) remove damaged items, unless needed untouched for investigation purposes, and restore the location of the emergency;
 - (k) debrief the relevant personnel;
 - (l) prepare any required post-emergency report or notification; and
 - (m) evaluate the effectiveness of the ERP and update it, if required.
- 4.5. As a minimum, the ERP should include procedures for:
- (a) an orderly transition from the normal phase to the emergency response phase;
 - (b) the assignment of emergency responsibilities and roles (see point 5);
 - (c) coordinated action and interaction with other entities to respond to the emergency situation; and
 - (d) return to normal operation as soon as practicable.
- 4.6. The ERP should include a procedure for recording the information on the emergency situation and on the subsequent response. That procedure should also cover how to gather information from a third party that reports an emergency situation caused by a UA of the UAS operator.
- 4.7. The ERP should include procedures for handling hazardous materials in an emergency situation, if applicable.
- 4.8. The ERP should include checklists that:
- (a) are suitable for the identified emergency situations, as per point 4.1;
 - (b) clearly indicate the sequence of actions and the personnel responsible to carry out those actions; and
 - (c) provide the contact details of key stakeholders, as per point 5.4.
- 4.9. The content of the ERP should be kept up to date and reflect all organisational or operational changes that may affect it.

5. Roles, responsibilities, and key points of contact

- 5.1. The UAS operator should nominate an emergency response manager (ERM) who has the overall responsibility for the emergency response.
- 5.2. If the UAS operator is not a one-person entity and/or manages external personnel in an emergency response, the UAS operator should establish an emergency response team (ERT) that:
- (a) is led by the ERM;
 - (b) includes a core ERT that comprises persons with a role that implies being directly involved in responding to an emergency situation; and
 - (c) includes, if applicable, a support ERT that comprises ERT members who support the core ERT in responding to the emergency situation.

- 5.3. The ERP should provide a clear delineation of the responsibilities in an emergency response, including the duties of the remote pilot(s) and of any other personnel in charge of duties essential to the UAS operation.
- 5.4. The ERP should establish a contact list(s) of key staff, relevant authorities, and entities involved in an emergency response, including:
 - (a) the full names, roles, responsibilities, and contact details of the ERM and, if applicable, of the ERT members, including their replacement if the nominated persons are unavailable; and
 - (b) the full names, roles, responsibilities, and contact details of the relevant authorities and entities outside the UAS operator to be contacted in case of emergency; in addition, the single European emergency call number '112' should be indicated as an emergency contact number for UAS operations that are conducted in any of the EASA Member States and in any other State where that number is used¹.
- 5.5. The ERP should indicate the person(s) responsible for the emergency response means (refer to point 6.2) and their contact details. The responsible person(s) should ensure that those means are available and usable when needed.
- 5.6. To ensure a prompt response, the ERM and other ERT members, if applicable, should have direct access to:
 - (a) the emergency response checklists that are indicated in point 4.8; and
 - (b) if not included in the checklists referred to in (a), the contact list(s) indicated in point 5.4.

6. Emergency response means

- 6.1. The ERP should indicate the means to be used by the UAS operator to respond to an emergency, which may include one or more of the following:
 - (a) facilities, infrastructure, and equipment;
 - (b) extinguishing means, e.g. fire extinguishers, fireproof portable electronic device (PED) bags;
 - (c) personal protective equipment, e.g. protective clothing, high-visibility clothing, helmets, goggles, gloves;
 - (d) medical means, including first-aid kits;
 - (e) communication means, e.g. phones (landline and mobile), walkie-talkies, aviation radios, internet; and
 - (f) others.

¹ Chapter 5 *Reaction to an emergency call* of the European Helicopter Safety Team (EHST) *Safety Management Toolkit for Non-Complex Operators — Emergency Response Plan — A Template for Industry* (2nd edition, October 2014) (<https://www.easa.europa.eu/document-library/general-publications/ehst-safety-management-toolkit-non-complexoperators-2nd>), and the 'primary accident information sheet' in its Section 5.1 may be a suitable reference for developing a procedure to indicate how to gather information from a third party on an emergency involving a UA of the UAS operator. Section 6.5 *Crisis Log* provides an example of a 'crisis log' that might be useful for developing a template to record the emergency situation and the response to it.

- 6.2. The person(s) in charge of the emergency response means should have an updated record of the available means that are indicated in point 6.1, including their number and status (e.g. expiry date of perishable means).

7. ERP validation

- 7.1. If the UAS operator is a one-person entity and does not manage external personnel in an emergency response, the UAS operator should at least ensure that:
- (a) the procedures that are indicated in point 4 cover all the identified emergency situations and that the necessary actions are reflected in the corresponding checklist(s);
 - (b) the contact details in the list(s) indicated in point 5.4 are up to date; and
 - (c) the availability of the emergency response means that are indicated in point 6 is checked before conducting any UAS operation, in particular that the communication means to alert the relevant contacts (see point (b)) are operational.
- 7.2. If the UAS operator is not a one-person entity and/or manages external personnel in an emergency response, in addition to complying with point 7.1, the UAS operator should conduct a tabletop exercise¹ that:
- (a) is established in accordance with the criteria that are indicated in the ERP to be considered representative;
 - (b) is consistent with the ERP training syllabus;
 - (c) includes sessions where one or more scenarios of the identified emergency situations are discussed by the exercise participants, which should include the relevant ERT members for each of the sessions; all aspects of the ERP should be covered once all sessions of the tabletop exercise have been completed;
 - (d) is guided by the ERM or any other person designated by the UAS operator to act as a facilitator;
 - (e) may include the participation of third parties that are identified in the ERP; the participation conditions for those third parties should be indicated in the ERP; and
 - (f) is performed with the periodicity that is indicated in the ERP.

However, if the UAS operator is a one-person entity and does not manage external personnel in an emergency response, a tabletop exercise may not be appropriate as the participation of third parties is not required. In such case, the conditions of point 7.1 are deemed sufficient and proportionate to the level of simplicity of the operator and, in principle, of the UAS operations.

¹ Please refer to GM2 ADR.OPS.B.005(c) *Aerodrome emergency planning* (see AMC and GM to Authority, Organisation and Operations Requirements for Aerodromes), which defines the following three categories of exercises for emergency planning:

- (a) full-scale exercises;
- (b) partial emergency exercises; and
- (c) tabletop exercises.

For UAS operators with a more complex structure as well as for complex UAS operations, the tabletop exercises may need to be complemented with partial emergency exercises and/or full-scale exercises, including the corresponding drills.

- 7.3. After following the procedures that are described in the ERP in a real emergency situation, the UAS operator should conduct an analysis of the way the emergency was managed and verify the effectiveness of the ERP.

8. ERP training

- 8.1. The UAS operator should provide relevant personnel, and in particular ERT members, with ERP training.
- 8.2. The UAS operator should develop a training syllabus that covers all the elements of the ERP.
- 8.3. The UAS operator should compile and keep up to date a record of the ERP training that is completed by the relevant personnel.
- 8.4. The competent authority that issues the authorisation or an entity that is designated by that competent authority should verify the competencies of the relevant personnel.

UAS.SPEC.040 Issuing of an operational authorisation

Regulation (EU) 2020/639

- (1) When receiving an application in accordance with point [UAS.SPEC.030](#), the competent authority shall issue, without undue delay, an operational authorisation in accordance with [Article 12](#) when it concludes that the operation meets the following conditions:
 - (a) all information in accordance with point (3) of point [UAS.SPEC.030](#) is provided;
 - (b) a procedure is in place for coordination with the relevant service provider for the airspace if the entire operation, or part of it, is to be conducted in controlled airspace.
- (2) The competent authority shall specify in the operational authorisation the exact scope of the authorisation in accordance with [Article 12](#).

AMC1 UAS.SPEC.040(1) Operational authorisation — EASA Form 209

ED Decision 2025/018/R

OPERATIONAL AUTHORISATION TEMPLATE

The competent authority should produce the operational authorisation according to the following form:

	Operational authorisation for the 'specific' category			
1. Authority that issues the authorisation				
1.1 Issuing authority				
1.2 Point of contact Office Telephone Email				
2. UAS operator data				
2.1 UAS operator registration number				
2.2 UAS operator name				
2.3 Point of contact Name Telephone Email				
3. Authorised operation				
3.1 Authorised location(s) including the lower and upper limits of the operational volume	☐ Generic, lower limit __m (__ ft), upper limit __m (__ ft) ☐ Precise, specify coordinates _____, lower limit __m (__ ft), upper limit __m (__ ft)			
3.2 Risk assessment reference and revision	☐ SORA edition date ____			

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	3.8.4 M2 — Mitigation to reduce effect of ground impact	☐ No ☐ Medium ☐ High	
3.9 Final ground risk class (GRC)			
3.10 Residual air risk level in the operational volume		☐ ARC-a ☐ ARC-b ☐ ARC-c ☐ ARC-d	
3.11 Air risk mitigations	3.11.1 Strategic mitigations	☐ No ☐ Yes If yes, please describe _____	
	3.11.2 Tactical mitigation methods		
3.12 Achieved level of containment		☐ Low ☐ Medium ☐ High ☐ Tethered	
3.13 What is the minimum RP:UA ratio allowed between the remote pilot (RP) and the UA that may be operated simultaneously?		RP:UA ____:____	
3.14 Remote pilot competency			
3.15 Competency of staff, other than the remote pilot, essential for the safety of the operation			
3.16 Type of events to be reported to the competent authority (in addition to those required by Regulation (EU) No 376/2014)			
3.17 Insurance		☐ No ☐ Yes	
3.18 Compliance matrix file reference			
3.19 Remarks / additional limitations			
4. Data of authorised UAS			
4.1 Design organisation name (optional)		4.2 Model name (optional)	
4.3 Type of UAS	☐ Fixed-wing ☐ Rotorcraft-helicopter ☐ Rotorcraft-gyroplane ☐ VTOL-capable UA (including multirotors)	4.4 Maximum UA characteristic dimensions	_____ m

	☐ Lighter than air / other		
4.5 Take-off mass (optional)	_____ kg	4.6 Maximum operational speed	_____ m/s (_____ kt)
4.7 Type of C2 link			
4.8 Size of the adjacent ground area	_____ km		
4.9 Additional technical requirements			
4.10 Serial number or, if applicable, UA registration mark (optional)			
4.11 Number of type certificate (TC) or design verification report (DVR), number and issue date (optional)			
4.12 Number of the certificate of airworthiness (CofA) (optional)			
4.13 Number of the noise certificate (optional)			
4.14 E-conspicuity system	☐ Direct remote ID ☐ Network remote ID ☐ SRD-860 in ☐ SRD-860 out ☐ ADS-B In ☐ ADS-B Out ☐ Other _____		
5. Remarks			
6. Operational authorisation			
_____ [Insert UAS operator name] is authorised to conduct UAS operations with the UAS(s) defined in Section 4 and according to the conditions and limitations defined in Section 3, for as long as it complies with this operational authorisation, with Implementing Regulation (EU) 2019/947, and with any applicable Union and national regulations related to privacy, data protection, liability, insurance, security, and environmental protection. Any flight outside [insert Member State name] must comply with all the requirements defined in this operational authorisation and is subject to validation by the competent authority of the Member State where the operation is intended to be performed, in accordance with Article 13 of Implementing Regulation (EU) 2019/947. The conditions specified in this operational authorisation shall be supplemented, where necessary, by proof of compliance with the local conditions published by the Member State where the operation is intended to be performed and the			



implementation of mitigations to address risks specific to the airspace, terrain, population and climatic conditions of the flight area.			
6.1 Operational authorisation number			
6.2 Valid from	DD/MM/YYYY	6.3 Expiry date	DD/MM/YYYY
Date DD/MM/YYYY		Signature and stamp	

EASA Form 209
Instructions for filling in the operational authorisation form

- 1.1 Name of the competent authority that issues the operational authorisation, including the name of the State.
- 1.2 Contact details of the competent authority's staff responsible for the file.
- 2.1 UAS operator's registration number in accordance with [Article 14](#) of the UAS Regulation.
- 2.2 UAS operator's name, as registered in the UAS operator's registration database. This is an optional field as the information may be retrieved from the UAS operator's registration.
- 2.3 Contact details of the person responsible for the UAS operation, in charge to answer possible operational questions raised by the competent authority.
- 3.1 Location(s) where the UAS operator is authorised to operate. It should include the maximum flight altitude, expressed in metres and feet in parentheses, of the approved operational volume using the AGL reference when the upper limit is below 150 m (492 ft), or use the MSL reference when the upper limit is above 150 m (492 ft).

The identification of the location(s) should contain the full operational volume and ground risk buffer (the red line in Figure 1). Depending on the initial ground and air risk classification determined using the SORA process and on the application of mitigations, the location(s) may be 'generic' or 'precise' (refer to [GM2 UAS.SPEC.030\(2\)](#)). When the UAS operation is conducted in a Member State other than the State of registration, the competent authority of the Member State of registration should specify the location(s) only after receiving confirmation from the State of operation, according to [Article 13](#) of the UAS Regulation.

In case of 'precise' locations, the information may be provided in a separate file listing all authorised locations using a file format to display geographic data (e.g. kml, Json, etc.).

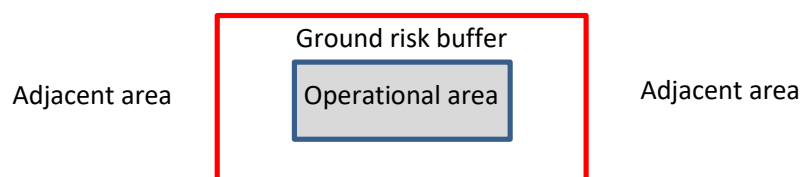


Figure 1 — Operational area and ground risk buffer

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- 3.2 Select one of the three options. If the SORA is used, indicate the edition date as defined in [AMC1 Article 11](#). In case a PDRA is used, indicate the number and its edition date as defined in the applicable AMC to Article 11. In case a risk assessment methodology is used other than the SORA, provide its reference. In this last case, the UAS operator should demonstrate that the methodology complies with [Article 11](#) of the UAS Regulation.
- 3.3 If the risk methodology used is the SORA, indicate the final SAIL of the operation, otherwise select 'other' and provide the equivalent information provided by the risk assessment methodology used.
- 3.7 If a qualitative measurement of the population density is used, then select one of the qualitative descriptors, otherwise check one of the descriptors linked to the maximum population density allowed.
- 3.9. If the SORA has been used, indicate the final risk class achieved after the application of the ground mitigations. If another risk assessment methodology has been used, indicate the equivalent information.
- 3.11.2 Describe the air risk tactical mitigation methods to be applied by the UAS operator (e.g. employ airspace observer(s) or UA observer(s), etc.).
- 3.13 If the UAS flight manual provided by the UAS designer indicates that it is designed with a level of automation that reduces the remote pilot's workload allowing one remote pilot (RP) to control multiple UA simultaneously, then specify the number of UA that one remote pilot is permitted to control (e.g. in case one RP is able to control simultaneously five UA, indicate 'RP:UA 1:5'). This number should not exceed the limit defined in the UAS flight manual. Additionally, the UAS operator may decide to have a pool of remote pilots controlling multiple UA simultaneously. In this case, clear procedures should be developed to define who is the pilot-in-command, responsible during each phase of flight (e.g. in case three RPs are permitted to control simultaneously ten UA, indicate 'RP:UA 3:10').
- 3.14 Specify the competency or the type of the remote pilot certificate, if required.
- 3.15 Specify the competency or the type of the certificate for the staff, other than the remote pilot, essential for the safety of the operation, if required.
- 3.16 List the type of events that the UAS operator should report to the competent authority, in addition to those required by [Regulation \(EU\) No 376/2014](#), if applicable.
- 3.18 Indicate the compliance matrix file identification and revision number (e.g. the compliance matrix defined in Chapter A4 of [Annex A to AMC1 Article 11](#) (SORA)).
- 3.19 Free-text field where the competent authority may provide any additional relevant information.
- Section 4. This section may be replicated for all authorised UAS models to be used under this operational authorisation.
- 4.1 Name of the manufacturer of the UAS. This field is optional.
- 4.2 Model of the UAS as defined by the design organisation in the UAS flight manual. This field is optional.
- 4.3 Fixed-wing UA includes configurations such as aeroplanes, kites, gliders, etc.
Rotorcraft-helicopter UA includes all vertical-lift configurations having up to 2 rotors.
Rotorcraft-gyroplane UA is a special configuration with unpowered rotor.

VTOL-capable aircraft (VCA), including rotorcraft, includes vertical-lift configurations with 3 or more rotors and fixed-wing UA capable of vertically taking off and landing.

Lighter-than-air configurations include configurations such as airships, hot-air balloons, etc.

- 4.4 Indicate the maximum dimensions of the UA in metres (refer to definition I.141 'UA characteristic dimension' in [Annex I to AMC1 Article 11](#) (SORA)).
- 4.5 Indicate the maximum value, of the UA take-off mass (TOM), expressed in kg, at which the UA may be operated. All flights should be conducted without exceeding the specified TOM. The TOM may be different from (however, not exceeding) the MTOM defined by the UAS design organisation in the UAS flight manual. This field is optional.
- 4.6 Maximum operational airspeed, expressed in m/s and kt in parentheses, that the UA will not exceed during the operation. This should always be lower than the maximum speed defined in the UAS flight manual.
- 4.7 Indicate the type of C2 link to be used during the operation (e.g. radio link, LTE/5G, satellite, etc.).
- 4.8 Provide the size in km to be considered for the adjacent ground area, starting from the limits of the ground risk buffer using the instructions defined in Section S.4.8.4 of [AMC1 Article 11](#) (SORA).
- 4.9 List any additional technical requirements established by the competent authority.
- 4.10 This field is mandatory in case the UA is registered according to Article 14(7) of Implementing Regulation (EU) 2019/947. If the UA is not registered, the NAA may indicate the unique serial number (SN) of the UA defined by the design organisation according to standard ANSI/CTA-2063-A-2019, *Small Unmanned Aerial Systems Serial Numbers*, 2019. In case of privately built UAS or UAS not equipped with a unique SN, insert the unique SN of the remote identification system. For UAS operations classified in SAIL V or higher, the serial numbers of all UAS should be provided and any change to them would require a prior approval from the competent authority. For UAS operations classified up to SAIL IV, a change to the serial number does not require prior approval from the competent authority.
- 4.11 Include the EASA TC number, or the UAS design verification report (DVR) number issued by EASA, if required by the competent authority.
- 4.12 If a UAS with an EASA TC is required, the UAS should have a certificate of airworthiness (CofA), and the competent authority should require compliance with the continuing airworthiness rules.
- 4.13 If a UAS with an EASA TC is required, the UAS should have a noise certificate.
- 5 Free-text field for the addition of any relevant remark.
- 6.1 Reference number of the operational authorisation, as issued by the competent authority. The number should have the following format:

NNN-OAT-xxxxx/yyy

Where:

- 'NNN' is the ISO 3166 Alpha-3 code of the Member State that issues the operational authorisation;
- 'OAT' is a fixed field meaning 'operational authorisation';

- 'xxxxx' are up to 12 alphanumeric characters defining the operational authorisation number; and
- 'yyy' are 3 alphanumeric characters defining the revision number of the operational authorisation;

each amendment of the operational authorisation will determine a new revision number.

6.2 The duration of the operational authorisation may be unlimited; in this case, indicate 'Unlimited'. The authorisation will be valid for as long as the UAS operator complies with the relevant requirements of the UAS Regulation and with the conditions defined in the operational authorisation.

Note: The signature and stamp may be provided in electronic form. The quick response (QR) code should provide the link to the national database where the operational authorisation is stored.

GM1 UAS.SPEC.040(1) Operational authorisation

ED Decision 2019/021/R

OPERATIONAL AUTHORISATION TEMPLATE

In order to facilitate mutual recognition in cases of cross-border operations, the competent authority should produce an English version of the operational authorisation.

UAS.SPEC.050 Responsibilities of the UAS operator

Commission Implementing Regulation (EU) 2021/1166

- (1) The UAS operator shall comply with all of the following:
- (a) establish procedures and limitations adapted to the type of the intended operation and the risk involved, including:
 - (i) operational procedures to ensure the safety of the operations;
 - (ii) procedures to ensure that security requirements applicable to the area of operations are complied with in the intended operation;
 - (iii) measures to protect against unlawful interference and unauthorised access;
 - (iv) procedures to ensure that all operations are in respect of Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data. In particular it shall carry out a data protection impact assessment, when required by the National Authority for data protection in application of Article 35 of Regulation (EU) 2016/679;
 - (v) guidelines for its remote pilots to plan UAS operations in a manner that minimises nuisances, including noise and other emissions-related nuisances, to people and animals.
 - (b) designate a remote pilot for each flight or, in the case of autonomous operations, ensure that during all phases of the flight, 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);
 - (c) ensure that all operations effectively use and support the efficient use of radio spectrum in order to avoid harmful interference;

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- (d) ensure that before conducting operations, remote pilots comply with all of the following conditions:
 - (i) have the competency to perform their tasks in line with the applicable training identified by the operational authorisation or, if point [UAS.SPEC.020](#) applies, by the conditions and limitations defined in the appropriate standard scenario listed in [Appendix 1](#) or as defined by the LUC;
 - (ii) follow remote pilot training which shall be competency based and include the competencies set out in paragraph 2 of [Article 8](#);
 - (iii) follow remote pilot training, as defined in the operational authorisation, for operations requiring such authorisation, it shall be conducted in cooperation with an entity designated by the competent authority;
 - (iv) follow remote pilot training for operations under declaration that shall be conducted in accordance with the mitigation measures defined by the standard scenario;
 - (v) have been informed about the UAS operator's operations manual, if required by the risk assessment and procedures established in accordance with point (a);
 - (vi) obtain updated information relevant to the intended operation about any geographical zones defined in accordance with [Article 15](#);
 - (e) ensure that personnel in charge of duties essential to the UAS operation, other than the remote pilot itself, comply with all of the following conditions:
 - (i) have completed the on-the-job-training developed by the operator;
 - (ii) have been informed about the UAS operator's operations manual, if required by the risk assessment, and about the procedures established in accordance with point (a);
 - (iii) have obtained updated information relevant to the intended operation about any geographical zones defined in accordance with [Article 15](#);
 - (f) carry out each operation within the limitations, conditions, and mitigation measures defined in the declaration or specified in the operational authorisation;
 - (g) keep and maintain an up-to-date record of:
 - (i) all the relevant qualifications and 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, for at least 3 years after those persons have ceased employment with the organisation or have changed their position in the organisation;
 - (ii) the maintenance activities conducted on the UAS for a minimum of 3 years;
 - (iii) the information on UAS operations, including any unusual technical or operational occurrences and other data as required by the declaration or by the operational authorisation for a minimum of 3 years;
 - (h) use UAS which, as a minimum, are designed in such a manner that a possible failure will not lead the UAS to fly outside the operation volume or to cause a fatality. In addition,

Man Machine interfaces shall be such to minimise the risk of pilot error and shall not cause unreasonable fatigue;

- (i) maintain the UAS in a suitable condition for safe operation by:
 - (i) as a minimum, defining maintenance instructions and employing an adequately trained and qualified maintenance staff; and
 - (ii) complying with point [UAS.SPEC.100](#), if required;
 - (iii) using an unmanned aircraft which is designed to minimise noise and other emissions, taking into account the type of the intended operations and geographical areas where the aircraft noise and other emissions are of concern.
- (j) establish and keep an up-to-date list of the designated remote pilots for each flight;
- (k) establish and keep an up-to-date list of the maintenance staff employed by the operator to carry out maintenance activities; and
- (l) ensure that each individual unmanned aircraft is installed with:
 - (i) at least one green flashing light for the purpose of visibility of the unmanned aircraft at night, and
 - (ii) an active and up-to-date remote identification system.

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

ED Decision 2019/021/R

OPERATIONAL PROCEDURES

- (a) The UAS operator should develop procedures as required by the standard scenario (STS) or by the operational authorisation.
- (b) If a UAS operator employs more than one remote pilot, the UAS operator should:
 - (1) develop procedures for UAS operations in order to coordinate the activities between its employees; and
 - (2) compile and maintain a list of their personnel and their assigned duties.
- (c) The UAS operator should allocate functions and responsibilities in accordance with the level of autonomy of the UAS during the operation.

AMC1 UAS.SPEC.050(1)(a) Responsibilities of the UAS operator

ED Decision 2019/021/R

OPERATIONAL PROCEDURES

The UAS operator should develop operational procedures based on the manufacturer's recommendations, if available.

When the UAS operator is required to develop an OM in accordance with point [UAS.SPEC.030\(3\)\(e\)](#), the procedures should be included in that manual.

GM1 UAS.SPEC.050(1)(a)(iv) Responsibilities of the UAS operator

ED Decision 2019/021/R

PROCEDURES TO ENSURE THAT ALL OPERATIONS ARE IN COMPLIANCE WITH REGULATION (EU) 2016/679 ON THE PROTECTION OF NATURAL PERSONS WITH REGARD TO THE PROCESSING OF PERSONAL DATA AND ON THE FREE MOVEMENT OF SUCH DATA

The UAS operator is responsible for complying with any applicable European Union and national rules, in particular, with regard to privacy, data protection, liability, insurance, security and environmental protection.

This GM has the purpose of providing guidance to the UAS operator to help them to identify and describe the procedures to ensure that the UAS operations are in compliance with Regulation (EU) 2016/679 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data.

*Description of the procedures established by the UAS operator
to ensure that the UAS operation is in compliance with Regulation (EU) 2016/679*

1. Identify the privacy risks¹ that the intended operation may create
2. Define your role with respect to personal data collection and processing
☐ I am the (joint) data controller ☐ I am the (joint) data processor
3. Data protection impact assessment (DPIA)
Have you assessed the need to perform a DPIA: Yes ☐ No ☐
If yes, do you have to perform a DPIA? Yes ☐ No ☐ - If yes, did you perform a DPIA? Yes ☐ No ☐
4. Describe the measures you are taking to ensure data subjects are aware that their data may be collected⁶
5. Describe the measures you are taking to minimise the personal data you are collecting or to avoid collecting personal data⁷
6. Describe the procedure established to store the personal data and limit access to it
7. Describe the measures taken to ensure that data subjects can exercise their right to access, correction, objection and erasure
8. Additional information

Notes:

1. For guidance regarding the identification of the **privacy risks** of your operation, please check:
 - The DR PRO online training course (*the link is temporary unavailable*): Module 1 — Privacy risks in context; and
 - [The DR PRO Privacy-by-Design Guide](#): Privacy risks and safeguards in drone manufacturing (page 10).
2. For more information about **definitions of personal data**, please check:
 - The DR PRO online training course (*the link is temporary unavailable*): Module 2 – What is personal data? and
 - [The DR PRO Privacy Code of Conduct](#): 3. Glossary.

'Data controller' means that you make decisions about what personal data is collected and how it is collected, processed and stored.

'Data processor' means that you follow instructions from another entity on collecting, processing and storing personal data.

For more information about your potential role as **data controller or data processor**, you can check:

 - The DR PRO online training course (*the link is temporary unavailable*): Module 2 – Data protection Roles; and
 - [The DR PRO Privacy Code of Conduct](#) for the responsibilities of data controllers.
3. For more information about when and how to conduct **data protection impact assessments** please check:
 - [The DR PRO Data Protection Impact Assessment template](#)
4. For more information about how to **inform data subjects** about your activities you can check:
 - [The DR PRO Privacy Code of Conduct](#): 4.3.2 Act visibly and transparently;
 - The DR PRO online training course (*the link is temporary unavailable*): Module 3 – Carry out your operation; and
 - The DR PRO Pre-flight checklist (*the link is temporary unavailable*)
5. For more information about the **data minimisation principle**, please check:
 - [The DR PRO Privacy Code of Conduct](#): 4.3.1 Minimise the impact on people's privacy and data protection;
 - [The DR PRO Privacy-by-Design Guide](#): Drone Privacy Enhancing Software Features; and
 - The DR PRO online training course (*the link is temporary unavailable*): Module 3 – Risk mitigation strategies.
6. For guidance on the **secure storage and access** to personal data, please check:
 - [The DR PRO Privacy Code of Conduct](#): 4.4.2 Handle data securely;
 - The DR PRO online training course (*the link is temporary unavailable*): Module 2 – How should personal data be handled? and
 - [The DR PRO Privacy-by-Design Guide](#): Drone Privacy Enhancing Software Features.

7. For more information about the **rights of data subjects**, please check:
- [The DR PRO Privacy Code of Conduct](#): 4.3.3 Respect the rights of individuals; and
 - The DR PRO online training course (*the link is temporary unavailable*): Module 2 – How should individuals be treated?

GM1 UAS.SPEC.050(1)(b) Responsibilities of the UAS operator

ED Decision 2019/021/R

LEVEL OF AUTONOMY AND GUIDELINES FOR HUMAN-AUTONOMY INTERACTION

The concept of autonomy, its levels and human-autonomous system interactions are currently being discussed in various domains (not only in aviation), and no common understanding has yet been reached. Guidance will therefore be provided once this concept is mature and globally accepted.

Nevertheless, the risk assessment of autonomous operations should ensure, as for any other operations, that the risk is mitigated to an acceptable level.

Besides, it is expected that autonomous operations or operations with a high level of autonomy will be subject to authorisation and will not be covered by STSs until enough experience is gained.

AMC1 UAS.SPEC.050(1)(d) and UAS.SPEC.050(1)(e) Responsibilities of the UAS operator

ED Decision 2022/002/R

THEORETICAL KNOWLEDGE SUBJECTS FOR THE TRAINING OF THE REMOTE PILOT AND ALL PERSONNEL IN CHARGE OF DUTIES ESSENTIAL TO THE UAS OPERATION IN THE 'SPECIFIC' CATEGORY

- (a) The 'specific' category may cover a wide range of UAS operations with different levels of risk and a wide range of UAS designs, in particular in terms of level of automation. The following guidelines may, therefore, have to be adapted considering the level of automation and the level of involvement of the remote pilot in the management of the flight. The UAS operator is, therefore, required to identify the competency required for the remote pilot according to the outcome of the risk assessment. This AMC covers the theoretical knowledge subjects while [AMC2 UAS.SPEC.050\(1\)\(d\)](#) covers the practical knowledge subjects applicable to all UAS operations in the 'specific' category. In addition, for both theoretical and practical knowledge subjects, the UAS operator should select the relevant additional modules from [AMC3 UAS.SPEC.050\(1\)\(d\)](#), as applicable to the type of the intended UAS operation. The UAS operator should achieve a level of robustness consistent with the assurance integrity level (e.g. SAIL) of the intended UAS operation.
- (b) Additional topics to cover areas under national competence, such as national regulations for security, privacy and data protection, may be added by the national competent authority. In case of operations conducted in a MS other than the State of registration, these additional topics may be defined as local conditions required by the MS of operation.
- (c) When the UAS operation is conducted according to one of the STSs that are listed in [Appendix 1](#) to the Annex of the UAS Regulation, the UAS operator should ensure that the remote pilot has the competency that is defined in the STSs. In all other cases, the UAS operator should propose to the competent authority, as part of the application, a theoretical knowledge training course for the remote pilot based on the elements that are listed in [AMC1 UAS.OPEN.020\(4\)\(b\)](#), in [UAS.OPEN.040\(3\)](#), in [AMC1 UAS.OPEN.030\(2\)\(c\)](#) and in Attachment A to the Annex of the UAS

Regulation, which are relevant for the intended operation, complemented by the elements listed below. The UAS operator may use the same listed topics to propose also for the personnel in charge of duties essential to the UAS operation a theoretical knowledge training course with competency-based theoretical training specific to the duties of that personnel.

- (1) Aviation safety:
 - (i) remote pilot records;
 - (ii) logbooks and associated documentation;
 - (iii) good airmanship principles;
 - (iv) aeronautical decision-making;
 - (v) ground safety;
 - (vi) air safety;
 - (vii) air proximity reporting; and
 - (viii) advanced airmanship:
 - (A) manoeuvres and emergency procedures; and
 - (B) general information on unusual conditions (e.g. stalls, spins, vertical lift limitations, autorotation, vortex ring states).
- (2) Aviation regulations:
 - (i) introduction to the UAS Regulation with focus on the 'specific' category;
 - (ii) risk assessment, introduction to the SORA; and
 - (iii) overview of the STSs and the PDRA.
- (3) Navigation:
 - (i) navigational aids (e.g. GNSS) and their limitations;
 - (ii) reading maps and aeronautical charts (e.g. 1:500 000 and 1:250 000, interpretation, specialised charts, helicopter routes, U-space service areas, and understanding of basic terms); and
 - (iii) vertical navigation (e.g. reference altitudes and heights, altimetry).
- (4) Human performance limitations:
 - (i) perception (situational awareness in BVLOS operations);
 - (ii) fatigue:
 - (A) flight duration within work hours;
 - (B) circadian rhythm;
 - (C) work stress;
 - (D) vision problems; and
 - (E) commercial pressure;
 - (iii) attentiveness:

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- (A) eliminating distractions; and
 - (B) scan techniques;
 - (iv) medical fitness (health precautions, alcohol, drugs, medication, etc.); and
 - (v) environmental factors such as vision changes from orientation to the sun.
 - (5) **Airspace operating principles:**
 - (i) airspace classifications and operating principles;
 - (ii) U-space;
 - (iii) procedures for airspace reservation;
 - (iv) aeronautical information publications (AIPs); and
 - (v) NOTAMs.
 - (6) **General knowledge of UASs and external systems that support the operation of UASs:**
 - (i) differences between autonomy levels (e.g. automatic versus autonomous operations);
 - (ii) loss of signal and system failure protocols — understanding the condition and planning for programmed responses such as returning to home, loiter, landing immediately;
 - (iii) equipment to mitigate air and ground risks (e.g. flight termination systems);
 - (iv) flight control modes;
 - (v) the means to monitor the UA (its position, height, speed, C2 link, systems status, etc.);
 - (vi) the means of communication with the VOs; and
 - (vii) the means to support air traffic awareness.
 - (7) **Meteorology:**
 - (i) obtaining and interpreting advanced weather information:
 - (A) weather reporting resources;
 - (B) reports;
 - (C) forecasts and meteorological conventions appropriate for typical UAS flight operations;
 - (D) local weather assessments (including sea breeze, sea breeze front, and urban heat island);
 - (E) low-level charts; and
 - (F) METAR, SPECI, TAF;
 - (ii) regional weather effects — standard weather patterns in coastal, mountain or desert terrains; and
 - (iii) weather effects on the UA (wind, storms, mist, variation of wind with altitude, wind shear, etc.).

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- (8) Technical and operational mitigation measures for air risks:
 - (i) operations for which airspace observers (AOs) are employed; and
 - (ii) principles of detect and avoid (DAA).
 - (9) Operational procedures:
 - (i) mission planning, airspace considerations, and site risk assessment:
 - (A) measures to comply with the limitations and conditions applicable to the operational volume and to the ground risk buffer for the intended UAS operation;
 - (B) UAS operations over a controlled ground area;
 - (C) BVLOS operations;
 - (D) use of UA VOs;
 - (E) importance of on-site inspections, operation planning, pre-flight and operating procedures;
 - (ii) multi-crew cooperation (MCC):
 - (A) coordination between the remote pilot and other personnel (e.g. AOs) in charge of duties essential to the UAS operation;
 - (B) crew resource management (CRM):
 - (a) effective leadership;
 - (b) working with others.
 - (10) Managing data sources regarding:
 - (i) where to obtain the data from;
 - (ii) the security of the data;
 - (iii) the quantity of the data needed; and
 - (iv) the impact on the storage of data
 - (c) emergency response plan (ERP) — the UAS operator should provide its personnel with competency-based theoretical training covering the ERP that includes the related proficiency requirements and recurrent training.
 - (d) Both the training and the assessment should be appropriate to the level of automation of the intended UAS operation.

AMC2 UAS.SPEC.050(1)(d) and UAS.SPEC.050(1)(e) Responsibilities of the UAS operator

ED Decision 2022/002/R

PRACTICAL-SKILLS TRAINING FOR THE REMOTE PILOT AND ALL PERSONNEL IN CHARGE OF DUTIES ESSENTIAL TO THE UAS OPERATION IN THE 'SPECIFIC' CATEGORY

- (a) Regarding the practical-skills training and assessment for the remote pilot, the UAS operator should consider the competencies that are defined in [AMC2 UAS.OPEN.030\(2\)\(b\)](#),

complemented by the items listed below. The UAS operator should adapt the practical-skills training to the characteristics of the intended UAS operation and the functions available on the UAS. The UAS operator may use the same listed topics and may provide a practical training course also for all other personnel in charge of duties essential to the UAS operation. Appropriate simulators may be used to conduct some or all the tasks.

- (1) Preparation of the UAS operation:
 - (i) implement the necessary measures to comply with the limitations and conditions applicable to the operational volume and to the ground risk buffer for the intended UAS operation in accordance with the OM procedures;
 - (ii) follow the necessary procedures for UAS operations in controlled airspace, including a protocol to communicate with the ATC and obtain clearance and instructions, if necessary;
 - (iii) confirm that all necessary documents for the intended UAS operation are on-site;
 - (iv) brief all participants on the planned UAS operation;
 - (v) perform visual airspace scanning; and
 - (vi) if AOs are employed, place them appropriately and brief them on the deconfliction scheme that includes phraseology.
- (2) Preparation for the flight:
 - (i) ensure that all safety systems and functions, if installed on the UAS, including its height and speed limitation systems, flight termination system, and triggering system, are operational; and
 - (ii) know the basic actions to be taken in the event of an emergency, including issues with the UAS, or a mid-air collision hazard arising during the flight.
- (3) Flight under abnormal conditions:
 - (i) manage a partial or a complete power shortage of the UA propulsion system, while ensuring the safety of third parties on the ground;
 - (ii) manage a situation of a non-involved person entering the operational volume or the controlled ground area, and take appropriate measures to maintain safety; and
 - (iii) react to, and take the appropriate corrective actions for, a situation where the UA is likely to exceed the limits of both the flight geography (contingency procedures) and of the operational volume (emergency procedures) as they were defined during the flight preparation.
- (4) In general, emphasis should be placed on the following:
 - (i) normal, contingency, and emergency procedures;
 - (ii) skill tests combined with periodic proficiency checks;
 - (iii) operational experience (with on-the-job training counting towards proficiency);
 - (iv) pre-flight and post-flight procedures and documentation;
 - (v) recurrent training (UAS / flight training device (FTD)); and
 - (vi) remote pilot incapacitation.

- (b) The practical-skills training may be conducted with the UAS or on an FTD. Scenario-based training (SBT) with highly structured, real-world experience scripts for the intended UAS operation should be used to fortify personnel's learning in an operational environment and improve situational awareness. SBT should include realistic normal, abnormal, and emergency scenarios that are drafted considering specific learning objectives.
- (c) The practical-skills training is checked during the assessment and can be provided using the actual UAS or an FTD appropriate to the intended UAS operation.
- (d) Initial and recurrent training
 - (1) The UAS operator should ensure that specified minimum requirements regarding the time of the initial and recurrent training (e.g. duration and number of flight hours) are provided for in a manner that is acceptable and approved by the competent authority.
 - (2) Depending on the training course, each of the topics shown in Table 1 below may require only overview training or in-depth training. In-depth training should be interactive and should include discussions, case-study reviews, and role play, as deemed necessary to enhance learning. In case of change or update of the SW/HW of the UAS, depending on the size of the changes, the UAS operator should define the level of training.

Topic	Initial training	Change of UAS	Change of remote pilot/crew	Recurrent training
Situational awareness and error management	In-depth	In-depth	Overview	Overview
Organisational safety culture, operational procedures, and organisational structure	In-depth	Not required	In-depth	Overview
Stress management, fatigue, and vigilance	In-depth	Not required	Not required	Overview
Decision-making	In-depth	Overview	Not required	Overview
Automation and philosophy of the use of automation	As required	In-depth	In-depth	As required
Specific UAS type-related differences	As required	In-depth	Not required for the same UAS type)	As required
Case-based studies	In-depth	In-depth	In-depth	As required

Table 1 — Level of the practical-skills training in several topics depending on initial training, recurrent training, or change of UAS / remote pilot / remote crew

AMC3 UAS.SPEC.050(1)(d) Responsibilities of the UAS operator

ED Decision 2022/002/R

UAS OPERATION-SPECIFIC ENDORSEMENT MODULES

Depending on the type and risk of the intended UAS operation, the UAS operator may propose, as part of the application for an operational authorisation, additional theoretical knowledge training in combination with the practical-skills training that is specific to the intended UAS operation as described in the OM.

The practical-skills training should at least contain the practical competencies that are described in [AMC2 UAS.OPEN.030\(2\)\(b\)](#) 'UAS operations in subcategory A2', which may include relevant emergency and contingency procedures. However, the UAS operator may adapt that training to the level of automation of the UAS.

During the practical-skills training, the remote pilot should list the relevant emergency and contingency procedures, which are defined in the OM and are peculiar to flight over known populated areas or over assemblies of people or increased air risk, in a given area of operation, and should describe the basic conditions for each kind of emergency as well as the related recovery techniques to be applied during flight for the emergencies that are defined in the OM. Depending on the criticality of the situation and on the available time to react, the remote pilot should memorise some procedures, while for other procedures, they may consult a checklist. The emergency and contingency procedures may involve also other personnel; in that case, the UAS operator should define the practical-skills training needed for them.

The remote pilot only needs to complete the relevant operation-specific endorsement modules that reflect the intended UAS operation. For example, in case of transport of cargo, the remote pilot should complete the related training module 'Transport and/or dropping of cargo'; however, if the cargo contains dangerous goods, then the remote pilot should also complete the training module 'Transport of dangerous goods'.

The assurance level of the operation-specific endorsement modules is determined by the related assurance integrity level (e.g. SAIL) according to the respective specific operational risk assessment.

Relevant UAS operation-specific endorsement modules should be reflected in the documentation of the remote pilot's competencies.

The following UAS operation-specific endorsement modules and the areas to be covered are recommended:

- (a) night operations;
- (b) overflight (flight over known populated areas or over assemblies of people);
- (c) BVLOS operations;
- (d) low-altitude (below 500 ft) operations;
- (e) flights in non-segregated airspace;
- (f) transport and/or dropping of cargo;
- (g) transport of dangerous goods;
- (h) operations with multiple UASs and swarms;
- (i) UA launch and recovery using special equipment;

(j) flying over mountainous terrain.

Note: The 'Rationale' in grey-font italics under the 'Learning objectives' column is provided for explanatory purposes and does not form part of the proposed rule text.

Operation-specific endorsement modules	Areas to be covered	Learning objectives
Night operations	General	Recognise the meaning of the definition of 'night' or other similar wording that is used for night flight. <i>Rationale: In Regulation (EU) No 1178/2011 (the 'Aircrew Regulation'), 'night' for manned aviation 'means the period between the end of evening civil twilight and the beginning of morning civil twilight or such other period between sunset and sunrise as may be prescribed by the appropriate authority'.</i> <i>Some national laws use the sunset and sunrise times for the definition of a night flight. 'Sunset' is defined as the daily disappearance of the upper limb of the sun below the horizon. This time depends on the latitude and longitude of the viewpoint. There are many websites and apps to find out the sunset and sunrise times at a specific location.</i> Recognise the benefits of illuminating the operational area, especially during the critical phases of take-off and landing. Recognise that during night flight it is hard to estimate the distance between the UA and other obstacles if visibility is only ensured by the lights of the UA. Recognise that a visual obstacle avoidance system may be less accurate in night-time operations. Understand that if the sight of the UA is lost at night, return-to-home (RTH) should be immediately followed. <i>Rationale: During daytime, it is sometimes difficult to see the position of the UA, which is even more difficult at night.</i> Recognise that an infrared radiation (IR) camera allows one to see enough at night. Turning off the front green flashing light might improve the view because there will be no reflection in the on-board camera. Recognise that the IR camera does not help in case of rain/humidity, and that the IR visibility significantly decreases.

Operation-specific endorsement modules	Areas to be covered	Learning objectives
		Explain the use of the green flashing light at night. Explain the use of navigation lights, position lights, anti-collision lights, and other lights for UA controllability. Explain the use of lights (e.g. navigation, position, or anti-collision lights) for recognising the presence of manned aircraft. <i>Rationale: Those lights show where the UA is positioned and the direction in which the UA is aligned.</i> <i>For manned aircraft, a red navigation light is located on the leading edge of the left-wing tip and a green navigation light on the leading edge of the rightwing tip (for helicopters, on the left and right sides of the cockpit). A white navigation light is positioned on the tail as far aft as possible. High-intensity strobe lights are also located in those positions. They are used as anti-collision lights and flash twice after a short break. A red rotating beacon is also part of the anti-collision lights.</i>
	Degradation of visual acuity	Recognise that flying the UA at night degrades visual perception. Recognise night myopia, caused by the increasing pupil size. At low-light levels, without distant objects to focus on, the focusing mechanism of the eye may go to a resting myopic position. If night-vision goggles are used, know how they function.
	Night illusions	Define the term 'night illusion'. Recognise and overcome visual illusions that are caused by darkness, and understand the physiological conditions that may degrade night vision. State the limitations of night vision techniques at night and by day.
	Altered visual-scanning techniques	State the limitations of the different visual-scanning techniques at night and by day. <i>Rationale: Despite the value of electronic means of conflict detection, physical lookout remains an important defence against the loss of visual separation for all types of aircraft.</i> <i>To avoid collisions, the remote pilot should visually scan effectively from the moment the UA starts</i>

Operation-specific endorsement modules	Areas to be covered	Learning objectives
		<i>moving until it comes to a stop at the end of the flight. Collision threats are present everywhere.</i> <i>Before take-off, the remote pilot should visually check the take-off area to ensure that there are no other objects. After take-off, the remote pilot should continue to visually scan to ensure a safe departure of the UA with no obstacles.</i>
	Altered identification of obstacles	Explain the effect of obstacles on the take-off distance that is required at night. <i>Rationale: The remote pilot should know the flight area where the UA will fly at night. Objects look different and power lines are nearly invisible at night. It is, therefore, advisable that the remote pilot conduct a test flight during the daytime.</i>
Overflight (flight over known populated areas or over assemblies of people)	Identification of populated areas and assemblies of people	Explain the definition of 'populated area' and 'assemblies of people'.
	Optimising flight paths to reduce risk of exposure	Explain the effects of the following variables on the flight path and take-off distances: — take-off procedure; — obstacle clearances both laterally and vertically; — understand the lethality of a UAS including debris area through flying parts after a crash; and — recognise the importance of a defined emergency landing area.
	Likely operating sites and alternative sites	Recognise the different operating sites and alternative sites on the route of the overflight.
	Adequate clearance for wind effects, especially in urban environment	Explain how the wind changes at very low height due to its interaction with orography and buildings.
	Obstructions (wires, masts, buildings, etc.)	Explain the effect of obstacles on the required takeoff distance. Interpret all available procedures, data, and information regarding obstructions that could be encountered during overflight
	Avoiding third-party interference with the UA	Explain how to avoid third-party interference with the UA.

Operation-specific endorsement modules	Areas to be covered	Learning objectives
	Minimum separation distances from persons, vessels, vehicles, and structures	Explain the importance of minimum separation distances from persons, vessels, vehicles, and structures.
	Impact of electromagnetic interference, i.e. high-intensity radio transmissions	Describe the physical phenomenon 'interference'. Explain in which situations electromagnetic interference could occur, particularly with regard to electromagnetic emissions and signal reflections peculiar to an urban environment. Explain their impact on the UAS system (i.e. C2 link GNSS quality, etc.)
	Crowd control strategies and public access	Explain the importance of ensuring that no one is endangered within the take-off and landing area. Describe the different crowd control strategies. Explain the importance of having knowledge of public access.
BVLOS operations	Operation planning: airspace, terrain, obstacles, expected air traffic, and restricted areas	Explain the operation planning for BVLOS operations: — check the flying conditions (e.g. geographical zone, NOTAM) and obstacles along the planned route; — secure the necessary documentation before the BVLOS operation; — know and comply with the local conditions in the area where the BVLOS operation takes place; — ensure communication with the air traffic controller (ATCO), depending on the type of airspace within which the BVLOS operation is planned to be conducted; — plan the BVLOS operation including flight route and response to contingency and emergency events; — in uncontrolled airspace, check the actual traffic level of manned traffic along the planned route, including low-level traffic such as paragliders, hang gliders, helicopters, model aircraft, seaplanes and other possible traffic; — in uncontrolled airspace, verify that the UAS operation has been notified to manned

Operation-specific endorsement modules	Areas to be covered	Learning objectives
		aviation using, e.g. NOTAM, or other means used by manned aviation; — how to employ airspace observers (AOs), when needed; — consider the C2 link limitations (e.g. maximum range and presence of obstacles); and — use of conspicuity devices or traffic information / detection of incoming aircraft / deconfliction and emergency manoeuvres.
	Sensor systems and their limitations	State the limitations of the different sensor systems. <i>Rationale: UASs that are used for BVLOS operations should maintain precise positioning to avoid traffic conflict and to successfully carry out their mission. Environmental features, such as tunnels and urban canyons, can weaken GNSS signals or even cause them to be lost completely. To maintain accuracy in GNSS-denied environments, UA may use real-time kinematic (RTK) capable inertial navigation systems (INSs) that provide information from accelerometers and gyroscopes to accurately estimate position, velocity, heading, and attitude.</i>
	Cooperative and non-cooperative aircraft (airspace surveillance)	Identify the cooperative and non-cooperative detect-and-avoid (DAA) sensor/system capabilities for UA, if applicable. <i>Rationale: Cooperative and non-cooperative DSAA capabilities are key enablers for UA to safely and routinely access all airspace classes.</i>
	Roles and responsibilities of the remote pilot to remain clear of collision	Explain the traffic alert system and traffic collision avoidance system (TCAS) phraseologies, and how these systems work. Identify the roles and responsibilities of the remote pilot to remain clear of collision. Explain the collision avoidance methodology that is used in the operation to keep the UA clear of other traffic. <i>Rationale: Collision avoidance is emerging as a key enabler for UAS operations in civil airspace. The operational and technical challenges of UAS collision avoidance are complicated by the wide variety of UA, of their associated missions, and of their ground control capabilities. Numerous</i>

Operation-specific endorsement modules	Areas to be covered	Learning objectives
		<i>technological solutions for collision avoidance are being explored in the UAS community.</i>
	Command, control and communication (C3) link performance and limitations	Know the definition of 'C3'. Understand the relation between communications and effective command and control (C2). Understand the basic C3 structure. Understand the use of true and relative motion displays. Understand the problems inherent in C3. <i>Rationale: C3 cannot be accomplished without two-way communications. C3 would be impossible unless the remote pilot can collect feedback in some form. Basic to any C3 system is the incorporation of a reliable communications network.</i>
	Signal or communications latency for the C2 link	Understand the impact of signal or communications latency on the C2 link. Explain what can cause, and how to detect, a signal or communications latency. Describe the actions that are required following a signal or communications latency. <i>Rationale: BVLOS control may require a satellite communications link that implies a level of signal delay, or signal latency, which may impact on the accuracy of the BVLOS operation.</i>
	Planning for the loss of C2 link or for system failure	Understand the impact of a loss of C2 link. Explain what can cause, and how to detect, a system failure. Describe the actions that are required following a loss of C2 link. Describe how to plan the contingency routes in case of a loss of the C2 link. <i>Rationale: It is of utmost importance to keep track of the UASs in civil airspace, and to know what happens if the C2 link between the remote pilot's ground control station and the UAS is disrupted. In such a loss-of-the-C2-link situation, the UA usually flies on a pre-programmed contingency route based on its flight altitude, orientation, and bearing. The absence of situational awareness and direct communication from the UA makes it difficult or impossible for the ATCOs to discover the real position of the UA and identify if the</i>

Operation-specific endorsement modules	Areas to be covered	Learning objectives
		<i>pre-programmed contingency route is properly followed impairing the possibility to clear the traffic along its intended route.</i>
	Interpreting separate data sources	Interpret different data sources to identify whether during flight the UA follows the planned route.
	Crew resource management (CRM)	Explain the importance of CRM for BVLOS operations.
Low-altitude (below 500 ft) operations	Air traffic management (ATM) procedures	Describe the ATM procedures for low-altitude operations.
	Radio communications and phraseology	Define the meaning of 'standard words and phrases'. Recognise, describe, and use the correct standard phraseology for each phase of a visual flight rules (VFR) flight. Explain the selective calling (SelCal) system and aircraft communications addressing and reporting system (ACARS) phraseologies. Explain the traffic alert and collision avoidance system (TCAS) phraseologies.
	Situational awareness	Keep situational awareness, especially with low-level manned aircraft and, if necessary, employ airspace observers (AOs).
	Advanced aviation terminology	Explain the meaning of low-altitude operations related terminology.
Flight in non-segregated airspace	Clear roles and responsibilities	Describe the relationship between the initiating causes (or threats), the hazard (top (main) event), the risk mitigations (the controls and barriers), and the potential consequential results (loss states) when conducting a flight in a non-segregated airspace.
	Wake turbulence	State the wake turbulence categories for UA. State the wake turbulence separation minima.
Transport and/or dropping of cargo	Weight and balance	Describe the relationship between UA mass and structural stress. Describe why mass should be limited to ensure adequate margins of strength. Describe the relationship between UA mass and aircraft performance. Describe why UA mass should be limited to ensure adequate aircraft performance.

Operation-specific endorsement modules	Areas to be covered	Learning objectives
		Depending on the type of operation, describe the relationship between centre-of-gravity (CG) position and stability/controllability of the UA. Describe the consequences if the CG is in front of the forward limit. Describe the consequences if the CG is behind the aft limit. Describe the relationship between CG position and aircraft performance. Describe the effects of the CG position on the performance parameters (speed, altitude, endurance, and range). Be familiar with the abbreviations regarding mass and balance, e.g. (maximum) take-off mass ((M)TOM), (maximum) landing mass ((M)LM), basic empty mass (BEM), dry operating mass (DOM), operating mass (OM), and zero-fuel mass (ZFM). Describe the effects of changes in the load when dropping an object. Describe the effects of an unintended loss of the load. <i>Rationale: Mass and balance are extremely important for a UA. A UA that is not in balance may become difficult to control. Therefore, the overall balance should be considered when adding payloads, attaching gimbals, etc.</i>

Operation-specific endorsement modules	Areas to be covered	Learning objectives
	Load securing and awareness of dangerous goods	Calculate the MTOM and the MLM. Explain the reasons for restraining or securing cargo loads. Describe the basic methods of restraining or securing loads. Explain why the transport of dangerous goods by air is subject to an additional training module. State that certain articles and substances, which would otherwise be classified as dangerous goods, may be exempted if they are part of the UA equipment. <i>Rationale: The safe operation of the UAS requires to weigh all cargo in the UA (or provide an accurate estimate of weight using 'standard' values), load it correctly, and secure it to prevent loss or movement of the cargo during the flight.</i> <i>Loading should be performed in accordance with the applicable regulations and limitations. The UAS operator's loading procedures should be in accordance with the instructions given by the person that has the overall responsibility for the loading process for a particular UA flight. These loading instructions should match the requirements for cargo distribution that are included in the UA load and trim sheet.</i>

Operation-specific endorsement modules	Areas to be covered	Learning objectives
Transport of dangerous goods	Safe transport of dangerous goods	Explain the terminology relevant to dangerous goods. Be able to recognise dangerous goods and understand their labelling. Be able to interpret the documentation related to dangerous goods. Recognise dangerous goods by using 'safety data sheets' and the consumer labelling of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS). Explain that the provisions for the transport of dangerous goods by air are included in ICAO Doc 9284 'Technical Instructions for the Safe Transport of Dangerous Goods by Air'. State the emergency/reporting procedures in case of an event with dangerous goods, including that in the event of a dangerous-goods-related emergency regarding the UA, the remote pilot should inform the ATC organisation of the transport of dangerous goods. Explain the principles of compatibility and segregation of dangerous goods. Explain the special requirements for loading radioactive materials. Explain the use of the dangerous goods list. Explain the procedures for collecting safety data, e.g. reporting accidents, incidents, and occurrences with dangerous goods. <i>Note: The learning objectives should be derived from the Technical Instructions and should be commensurate with the personnel responsibilities.</i>
Operations with multiple UASs and swarms	Limitations related to human factors	Understand the human performance limitations in an operation with multiple UASs, including UAS swarms. List the vital actions that the remote pilot and the persons who assist the remote pilot should perform in case of an emergency descent of the multiple/swarming UASs.
	CRM	Explain the importance of CRM for operations with multiple UASs and swarms.
	Navigating multiple platforms	Describe how to navigate multiple platforms.

Operation-specific endorsement modules	Areas to be covered	Learning objectives
	Recognising system failures	Describe the different failures that may potentially occur during multiple/swarming UAS operations. Explain what to do in the event of a failure. Recognise that the remote pilot can override the system in the event of a failure.
	Emergency containment procedures	List the different emergency containment procedures and describe the basic conditions for each kind of emergency. Describe the recovery techniques in the event of engine or battery failure during multiple/swarming UAS operations.
UAS launch and recovery using special equipment	Operating procedures	Explain the specific procedures for launch and recovery operations. Explain the impact on the UA's behaviour when the systems for launch and recovery are operated from a moving vehicle, including ships.
	Recognising failures	Describe the different failures that may occur during launch and recovery operations. Explain what to do in the event of a failure. Describe the cases where the remote pilot can override the system in the event of a failure.
Flying over hilly environment	Temperature inversions	Describe the following: — the effect of thermic-induced turbulence near the Earth's surface; — surface effects; — diurnal and seasonal variations; — the effect of clouds; and — the effect of wind. <i>Rationale: The temperature can affect the density altitude. If the UA flies on a hot and humid day, the remote pilot will experience poor UA performance: as the temperature increases, the air molecules spread out. As a result, the propellers or motors of the UA do not have much air to grab on to.</i>
	Orographic lifting	Describe the effect of exploiting orographic lifting (i.e. slope or ridge) and the actions required. Describe the vertical movements, wind shear, and turbulence, which are typical of hilly environment. <i>Rationale: Orographic lifting occurs when an air mass is forced from a low elevation to a higher</i>

Operation-specific endorsement modules	Areas to be covered	Learning objectives
		<i>elevation as it moves over rising terrain. As the air mass gains altitude, it quickly cools down adiabatically, which can raise the relative humidity to 100 %, create clouds and, under the right conditions, cause precipitation¹.</i>
	Higher winds through passes	Describe the effects of wind shear and the actions required when wind shear is encountered at take-off and approach. Describe the precautions to be taken when wind shear is suspected at take-off and approach. Describe the effects of wind shear and the actions required following entry into strong downdraught wind shear. Describe the influence of a mountainous area on a frontal passage. <i>Rationale: In mountainous environment, the wind blows smoothly on the windward side of the mountain. On the leeward side, the wind follows the contours of the terrain and can be quite turbulent: this is called a katabatic wind. The stronger the wind, the higher the downward pressure. Such a wind will push the UA down towards the surface of the mountain. If the remote pilot does not know how to recognise a downdraft, which is downward moving air, the situation can become quite challenging.</i>
	Mountain waves	Explain the origin and formation of mountain waves. State the conditions necessary for the formation of mountain waves. Describe the structure and properties of mountain waves. Explain how mountain waves may be identified through their associated meteorological phenomena. Explain that mountain wave effects may exceed the performance or structural capability of the UA. Explain that mountain wave effects may be propagated from low to high levels. Indicate the turbulent zones (mountain waves, rotors) on a drawing of a mountain chain.

¹ For examples of such service providers, see the footnote in E.6 'OSOs related to the deterioration of external systems supporting UAS operations' of [Annex E to AMC1 Article 11](#) of the UAS Regulation.

Operation-specific endorsement modules	Areas to be covered	Learning objectives
	High- and low-pressure patterns	Describe the movements of fronts and pressure systems, and the life cycle of a midlatitude depression. State the rules for predicting the direction and the speed of movement of fronts. State the difference in the speed of cold and warm fronts. State the rules for predicting the direction and the speed of frontal depressions.
	Density altitude effects	Define pressure altitude and air density altitude. Explain the effects of all-up mass (AUM), pressure, temperature, density altitude, and humidity. Explain the influence of density altitude on the equilibrium of forces and moments in a stable hover, if applicable. <i>Rationale: Higher-density altitude means thinner air, and thinner air means that the remote pilot will experience poor UA performance. The propellers or motors of the UA do not have much air to grab on to. Lower-density altitude means thicker, denser air, and higher UA performance.</i> <i>This knowledge is very important when the remote pilot flies in a mountainous or other high-elevation environment.</i>

GM1 UAS.SPEC.050(1)(d)(iii) Responsibilities of the UAS operator

ED Decision 2022/002/R

COORDINATION OF THE UAS OPERATOR WITH THE DESIGNATED ENTITY(IES)

For UAS operations that require an operational authorisation, the training of the remote pilots must be provided in coordination with the entity(ies) that is (are) designated by the competent authority, only if the competent authority has nominated entities that meet the applicable criteria to provide the required training. If the competent authority has not designated any entity, then such coordination is not required.

AMC1 UAS.SPEC.050(1)(g) Responsibilities of the UAS operator

ED Decision 2019/021/R

LOGGING OF FLIGHT ACTIVITIES AND RECORD-KEEPING

- (a) An acceptable means to log and record the flight activities is to use a logbook, which may be electronic.
- (b) The information to be recorded should be indicated in the declaration or in the operational authorisation, which may include the following:
 - (1) the identification of the UAS (manufacturer, model/variant (e.g. serial number);
NOTE: if the UAS is not subject to registration, the identification of the UAS may be done using the serial number of the UAS.
 - (2) the date, time, and location of the take-off and landing;
 - (3) the duration of each flight;
 - (4) the total number of flight hours/cycles;
 - (5) in the case of a remotely piloted operation, the name of the remote pilot responsible for the flight;
 - (6) the activity performed (add the reference to the STS or the authorisation number, as applicable);
 - (7) any significant incident or accident¹ that occurred during the operation;
 - (8) a completed pre-flight inspection;
 - (9) any defects and rectifications;
 - (10) any repairs and changes to the UAS configuration; and
 - (11) the information required to comply with [UAS.SPEC.100](#).
- (c) Records should be stored for 2 years in a manner that ensures their protection from unauthorised access, damage, alteration, and theft.
- (d) The logbook can be generated in one of the following formats: electronic or paper. If the paper format is used, it should contain, in a single volume, all the pages needed to log the holder's flight time. When one volume is completed, a new one will be started based on the cumulative data from the previous one.

UAS.SPEC.060 Responsibilities of the remote pilot

Regulation (EU) 2020/639

- (1) The remote pilot shall:
 - (a) 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;

¹ As defined by Regulation (EU) No 376/2014.

- (b) 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.
 - (c) be familiar with manufacturer's instructions provided by the manufacturer of the UAS.
- (2) Before starting an UAS operation, the remote pilot shall comply with all of the following:
 - (a) obtain updated information relevant to the intended operation about any geographical zones defined in accordance with [Article 15](#);
 - (b) ensure that the operating environment is compatible with the authorised or declared limitations and conditions;
 - (c) ensure that the UAS is in a safe condition to complete the intended flight safely, and if applicable, check if the direct remote identification is active and up-to-date;
 - (d) ensure that the information about the operation has been made available to the relevant air traffic service (ATS) unit, other airspace users and relevant stakeholders, as required by the operational authorisation or by the conditions published by the Member State for the geographical zone of operation in accordance with [Article 15](#).
- (3) During the flight, the remote pilot shall:
 - (a) comply with the authorised or declared limitations and conditions;
 - (b) avoid any risk of collision with any manned aircraft and discontinue a flight when continuing it may pose a risk to other aircraft, people, animals, environment or property;
 - (c) comply with the operational limitations in geographical zones defined in accordance with [Article 15](#);
 - (d) comply with the operator's procedures;
 - (e) not fly close to or inside areas where an emergency response effort is ongoing unless they have permission to do so from the responsible emergency response services.

AMC1 UAS.SPEC.060(2)(b) Responsibilities of the remote pilot

ED Decision 2019/021/R

OPERATING ENVIRONMENT

- (a) The remote pilot, or the UAS operator in the case of an autonomous operation, should check any conditions that might affect the UAS operation, such as the locations of people, property, vehicles, public roads, obstacles, aerodromes, critical infrastructure, and any other elements that may pose a risk to the safety of the UAS operation.
- (b) Familiarisation with the environment and obstacles should be conducted through a survey of the area where the operation is intended to be performed.
- (c) It should be verified that the weather conditions at the time when the operation starts and those that are expected for the entire period of the operation are compatible with those defined in the manufacturer's manual, as well as with the operational authorisation or declaration, as applicable.

- (d) The remote pilot should be familiar with the light conditions and make a reasonable effort to identify potential sources of electromagnetic energy, which may cause undesirable effects, such as EMI or physical damage to the operational equipment of the UAS.

AMC1 UAS.SPEC.060(2)(c) Responsibilities of the remote pilot

ED Decision 2019/021/R

THE UAS IS IN A SAFE CONDITION TO COMPLETE THE INTENDED FLIGHT

The remote pilot, or the operator in the case of an autonomous operation, should:

- (a) update the UAS with data for the geo-awareness function if one is available on the UA;
- (b) ensure that the UAS is fit to fly and complies with the instructions and limitations provided by the manufacturer;
- (c) ensure that any payload carried is properly secured and installed, respecting the limits for the mass and CG of the UA;
- (d) ensure that the UA has enough propulsion energy for the intended operation based on:
 - (i) the planned operation; and
 - (ii) the need for extra energy in case of unpredictable events; and
- (e) for a UAS equipped with a loss-of-data-link recovery function, ensure that the recovery function allows a safe recovery of the UAS for the envisaged operation; for programmable loss-of-data-link recovery functions, the remote pilot may have to set up the parameters of this function to adapt it to the envisaged operation.

UAS.SPEC.070 Transferability of an operational authorisation

Regulation (EU) 2020/639

An operational authorisation is not transferable.

UAS.SPEC.080 Duration and validity of an operational authorisation

Regulation (EU) 2020/639

- (1) The competent authority shall specify the duration of the operational authorisation in the authorisation itself.
- (2) Notwithstanding point (1), the operational authorisation remains valid as long as the UAS operator remains compliant with the relevant requirements of this Regulation and with the conditions defined in the operational authorisation.
- (3) Upon revocation or surrender of the operational authorisation the UAS operator shall provide an acknowledgment in digital format that must be returned to the competent authority without delay.

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

Regulation (EU) 2020/639

The operational declaration shall have a limited duration of 2 years. The declaration shall no longer be considered as complete within the meaning of point (4) of point [UAS.SPEC.020](#) if:

- (1) 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;
- (2) the conditions of the UAS operation have changed to the extent that the operational declaration no longer complies with the applicable requirements of this Regulation;
- (3) the competent authority is not granted access in accordance with point [UAS.SPEC.090](#).

UAS.SPEC.090 Access

Regulation (EU) 2020/639

For the purpose of demonstrating compliance with this Regulation, an UAS operator shall grant to any person, that is duly authorised by the competent authority, an access to any facility, UAS, document, records, data, procedures or to any other material relevant to its activity, which is subject to operational authorisation or operational declaration, regardless of whether or not its activity is contracted or subcontracted to another organisation.

UAS.SPEC.100 Use of certified equipment and certified unmanned aircraft

Regulation (EU) 2024/1110

- (1) Where the UAS operator uses an unmanned aircraft for which a certificate of airworthiness or a restricted certificate of airworthiness has been issued, the UAS operator shall ensure that the unmanned aircraft system complies with Delegated Regulation (EU) 2024/1107;
- (2) Where the UAS operator uses certified equipment on an unmanned aircraft for which neither a certificate of airworthiness nor a restricted certificate of airworthiness have been issued, the UAS operator shall carry out all of the following tasks:
 - (i) record the operation or service time in accordance with either the instructions or procedures applicable to the certified equipment;
 - (ii) follow the instructions referred to in the equipment certificate, and also comply with any applicable airworthiness directives issued by the Agency;
 - (iii) implement any safety measures mandated by the competent authority in accordance with Article 19(4);
 - (iv) use any relevant mandatory safety information issued by the Agency.

GM1 UAS.SPEC.100 The use of certified equipment and certified unmanned aircraft

ED Decision 2019/021/R

GENERAL

For the purposes of [UAS.SPEC.100](#), 'certified equipment' is considered to be any equipment for which the relevant design organisation has demonstrated compliance with the applicable certification specifications and received a form of recognition from EASA that attests such compliance (e.g. an ETSO authorisation). This process is independent from the CE marking process.

The use of certified equipment or certified UA in the 'specific' category of operation does not imply a transfer of the flight activities into the 'certified' category of operation. However, the use of certified equipment or certified UA in the 'specific' category should be considered as a risk reduction and/or mitigation measure in the SORA.

PART C — LIGHT UAS OPERATOR CERTIFICATE (LUC)

UAS.LUC.010 General requirements for an LUC

Regulation (EU) 2020/639

- (1) A legal person is eligible to apply for an LUC under this Part.
- (2) An application for an LUC or for an amendment to an existing LUC shall be submitted to the competent authority and shall contain all of the following information:
 - (a) a description of the UAS operator's management system, including its organisational structure and safety management system;
 - (b) the name(s) of the responsible UAS operator's personnel, including the person responsible for authorising operations with UASs;
 - (c) a statement that all the documentation submitted to the competent authority has been verified by the applicant and found to comply with the applicable requirements.
- (3) If the requirements of this Part are met, an LUC holder may be granted the privileges, in accordance with point [UAS.LUC.060](#).

GM1 UAS.LUC.010 General requirements for an LUC

ED Decision 2019/021/R

GENERAL

UAS operators may decide to apply for authorisations or issue declarations, as applicable, for their operations, or apply for an LUC.

An LUC holder is considered to be a UAS operator; therefore, they must register according to Article 14 and can do it in parallel to the LUC application.

AMC1 UAS.LUC.010(2) General requirements for an LUC

ED Decision 2019/021/R

APPLICATION FOR AN LUC

The application should include at least the following information:

- (a) Name and address of the applicant's principal place of business.
- (b) Statement that the application serves as a formal application for a LUC.
- (c) Statement that all the documentation submitted to the competent authority has been verified by the applicant and found to comply with the applicable requirements.
- (d) Desired date for the operation to commence.
- (e) Signature of the applicant's accountable manager.
- (f) List of attachments that accompany the formal application (*the following is not an exhaustive list*):

- (i) name(s) of the responsible UAS operator's personnel, including the accountable manager, operations, maintenance and training managers, the safety manager and security manager, the person responsible for authorising operations with UASs;
- (ii) list of UASs to be operated;
- (iii) details of the method of control and supervision of operations to be used;
- (iv) identification of the operation specifications sought;
- (v) OM and safety management manual (SMM). (Note: the OM and SMM may be combined under the LUC Manual);
- (vi) schedule of events in the process to gain the LUC certificate with appropriate events addressed and target dates;
- (vii) documents of purchase, leases, contracts or letters of intent;
- (viii) arrangements for the facilities and equipment required and available; and
- (ix) arrangements for crew and ground personnel training and qualification.

UAS.LUC.020 Responsibilities of the LUC holder

Regulation (EU) 2020/639

The LUC holder shall:

- (1) comply with the requirements of points [UAS.SPEC.050](#) and [UAS.SPEC.060](#);
- (2) comply with the scope and privileges defined in the terms of approval;
- (3) establish and maintain a system for exercising operational control over any operation conducted under the terms of its LUC;
- (4) carry out an operational risk assessment of the intended operation in accordance with [Article 11](#) unless conducting an operation for which an operational declaration is sufficient according to point [UAS.SPEC.020](#);
- (5) keep records of the following items in a manner that ensures protection from damage, alteration and theft for a period at least 3 years for operations conducted using the privileges specified under point [UAS.LUC.060](#):
 - (a) the operational risk assessment, when required according to point (4), and its supporting documentation;
 - (b) mitigation measures taken; and
 - (c) the qualifications and experience of personnel involved in the UAS operation, compliance monitoring and safety management;
- (6) keep personnel records referred to in point (5)(c) as long as the person works for the organisation and shall be retained until 3 years after the person has left the organisation.

AMC1 UAS.LUC.020(3) Responsibilities of the LUC holder

ED Decision 2019/021/R

OPERATIONAL CONTROL

The organisation and methods established by the LUC holder to exercise operational control within its organisation should be included in the OM as an additional chapter in relation to the template provided in [GM1 UAS.SPEC.030\(3\)\(e\)](#).

GM1 UAS.LUC.020(3) Responsibilities of the LUC holder

ED Decision 2019/021/R

OPERATIONAL CONTROL

'Operational control' should be understood as the responsibility for the initiation, continuation, termination or diversion of a flight in the interest of safety.

'System' in relation to operational control should be understood as the organisation, methods, documentation, personnel and training of those personnel for the initiation, continuation, termination or diversion of a flight in the interest of safety.

AMC1 UAS.LUC.020(5) Responsibilities of the LUC holder

ED Decision 2019/021/R

RECORD-KEEPING — GENERAL

The record-keeping system should ensure that all records are stored in a manner that ensures their protection from damage, alteration and theft. They should be accessible on request of the NAA, whenever needed within a reasonable time. These records should be organised in a way that ensures traceability, availability and retrievability throughout the required retention period. The retention period starts when the record was created or last amended. Adequate backups should be ensured.

UAS.LUC.030 Safety management system

Regulation (EU) 2020/639

- (1) An UAS operator who applies for an LUC shall establish, implement and maintain a safety management system corresponding to the size of the organisation, to the nature and complexity of its activities, taking into account the hazards and associated risks inherent in these activities.
- (2) The UAS operator shall comply with all of the following:
 - (a) nominate an accountable manager with authority for ensuring that within the organisation all activities are performed in accordance with the applicable standards and that the organisation is continuously in compliance with the requirements of the management system and the procedures identified in the LUC manual referred to in point [UAS.LUC.040](#);
 - (b) define clear lines of responsibility and accountability throughout the organisation;
 - (c) establish and maintain a safety policy and related corresponding safety objectives;
 - (d) appoint key safety personnel to execute the safety policy;

- (e) establish and maintain a safety risk management process including the identification of safety hazards associated with the activities of the UAS operator, as well as their evaluation and the management of associated risks, including taking action to mitigate those risks and verify the effectiveness of the action;
 - (f) promote safety in the organisation through:
 - (i) training and education;
 - (ii) communication;
 - (g) document all safety management system key processes for making personnel aware of their responsibilities and of the procedure for amending this documentation; key processes include:
 - (i) safety reporting and internal investigations;
 - (ii) operational control;
 - (iii) communication on safety;
 - (iv) training and safety promotion;
 - (v) compliance monitoring;
 - (vi) safety risk management;
 - (vii) management of change;
 - (viii) interface between organisations;
 - (ix) use of sub-contractors and partners;
 - (h) include an independent function to monitor the compliance and adequacy of the fulfilment of the relevant requirements of this Regulation, including a system to provide feedback of findings to the accountable manager to ensure effective implementation of corrective measures as necessary;
 - (i) include a function to ensure that safety risks inherent to a service or product delivered through subcontractors are assessed and mitigated under the operator's safety management system.
- (3) If the organisation holds other organisation certificates within the scope of Regulation (EU) 2018/1139, the safety management system of the UAS operator may be integrated with the safety management system that is required by any of those additional certificate(s).

AMC1 UAS.LUC.030(2) Safety management system

ED Decision 2019/021/R

PERSONNEL REQUIREMENTS — GENERAL

- (a) The accountable manager should have the authority to ensure that all activities are carried out in accordance with the requirements of the UAS Regulation.
- (b) The safety manager should:
 - (1) facilitate hazard identification, risk analysis, and risk management;
 - (2) monitor the implementation of risk mitigation measures;

- (3) provide periodic reports on safety performance;
 - (4) ensure maintenance of the safety management documentation;
 - (5) ensure that there is safety management training available and that it meets acceptable standards;
 - (6) provide all the personnel involved with advice on safety matters; and
 - (7) ensure the initiation and follow-up of internal occurrence investigations.
- (c) Management and other personnel of the LUC holder should be qualified for the planned operations in order to meet the relevant requirements of the UAS Regulation.
- (d) The LUC holder should ensure that its personnel receive appropriate training to remain in compliance with the relevant requirements of the UAS Regulation.

GM1 UAS.LUC.030(2)(a) Safety management system

ED Decision 2019/021/R

ACCOUNTABLE MANAGER

The accountable manager is a single, identifiable person who has the responsibility for the effective and efficient performance of the LUC holder's safety management system.

AMC1 UAS.LUC.030(2)(c) Safety management system

ED Decision 2019/021/R

SAFETY POLICY

- (a) The safety policy should:
- (1) be endorsed by the accountable manager;
 - (2) reflect organisational commitments regarding safety, and its proactive and systematic management;
 - (3) be communicated, with visible endorsement, throughout the organisation;
 - (4) include internal reporting principles, and encourage personnel to report errors related to UAS operations, incidents and hazards; and
 - (5) recognise the need for all personnel to cooperate with compliance monitoring and safety investigations.
- (b) The safety policy should include a commitment to:
- (1) improve towards the highest safety standards;
 - (2) comply with all applicable legislation, meet all applicable standards, and consider best practices;
 - (3) provide appropriate resources;
 - (4) apply the human factors principles;
 - (5) enforce safety as a primary responsibility of all managers; and
 - (6) apply 'just culture' principles and, in particular, not to make available or use the information on occurrences:

- (i) to attribute blame or liability to someone for reporting something which would not have been otherwise detected; or
 - (ii) for any purpose other than the improvement of safety.
- (c) The senior management of the UAS operator should:
 - (1) continually promote the UAS operator's safety policy to all personnel, and demonstrate their commitment to it;
 - (2) provide the necessary human and financial resources for the implementation of the safety policy; and
 - (3) establish safety objectives and associated performance standards.

GM1 UAS.LUC.030(2)(c) Safety management system

ED Decision 2019/021/R

SAFETY POLICY

The safety policy is the means whereby an organisation states its intention to maintain and, where practicable, improve safety levels in all its activities and to minimise its contribution to the risk of an accident or serious incident as far as is reasonably practicable. It reflects the management's commitment to safety, and should reflect the organisation's philosophy of safety management, as well as be the foundation on which the organisation's safety management system is built. It serves as a reminder of 'how we do business here'. The creation of a positive safety culture begins with the issuance of a clear, unequivocal direction.

The commitment to apply 'just culture' principles forms the basis for the organisation's internal rules that describe how 'just culture' principles are guaranteed and implemented.

For organisations that have their principal place of business in a MS, Regulation (EU) No 376/2014 defines the 'just culture' principles to be applied (refer in particular to Article 16(11) thereof).

GM1 UAS.LUC.030(2)(d) Safety management system

ED Decision 2019/021/R

PERSONNEL REQUIREMENTS

The functions of the safety manager may be fulfilled by the accountable manager or another person charged by the UAS operator with the responsibility of ensuring that the UAS operator remains in compliance with the requirements of the UAS Regulation.

Where the safety manager already fulfils the functions of the compliance monitoring manager, the accountable manager cannot be the safety manager.

Depending on the size of the organisation and the nature and complexity of its activities, the safety manager may be assisted by additional safety personnel for the performance of all the safety management tasks.

Regardless of the organisational set-up, it is important that the safety manager remains the unique focal point as regards the development, administration, and maintenance of the organisation's management system.

GM2 UAS.LUC.030(2)(d) Safety management system

ED Decision 2019/021/R

PERSONNEL REQUIREMENTS

A UAS operator may include a safety committee in the organisational structure of its safety management system and, if needed, one or more safety action groups.

(a) Safety committee

A safety committee may be established to support the accountable manager in their safety responsibilities. The safety committee should monitor:

- (1) the UAS operator's performance against safety objectives and performance standards;
- (2) whether safety action is taken in a timely manner; and
- (3) the effectiveness of the UAS operator's safety management processes.

(b) Safety action group

- (1) Depending on the scope of the task and the specific expertise required, one or more safety action groups should be established to assist the safety manager in their functions.
- (2) The safety action group should be comprised of managers, supervisors and personnel from operational areas, depending on the scope of the task and the specific expertise required.
- (3) The safety action group should at least perform the following:
 - (i) monitor operational safety and assess the impact of operational changes on safety;
 - (ii) define actions to mitigate the identified safety risks; and
 - (iii) ensure that safety measures are implemented within agreed timescales.

GM3 UAS.LUC.030(2)(d) Safety management system

ED Decision 2019/021/R

KEY SAFETY PERSONNEL

The UAS operator should appoint personnel to manage key fields of activity such as operations, maintenance, training, etc.

AMC1 UAS.LUC.030(2)(g) Safety management system

ED Decision 2019/021/R

DOCUMENTATION

The safety management system documentation of the LUC holder should be included in an SMM or in the LUC manual. If that documentation is contained in more than one operator's manual and is not duplicated, cross references should be provided.

GM1 UAS.LUC.030(2)(g)(i) Safety management system

ED Decision 2019/021/R

SAFETY REPORTING AND INTERNAL INVESTIGATIONS

The purpose of safety reporting and internal investigations is to use reported information to improve the level of safety performance of the UAS operator. The purpose is not to attribute blame or liability.

The specific objectives of safety reporting and internal investigations are to:

- (a) enable assessments of the safety implications of each relevant incident and accident, including previous similar occurrences, so that any necessary action can be initiated; and
- (b) ensure that knowledge of relevant incidents and accidents is disseminated so that other persons and UAS operators may learn from them.

All occurrence reports that are considered to be reportable by the person who submits the report should be retained, as the significance of such reports may only become obvious at a later date.

AMC1 UAS.LUC.030(2)(g)(iii) Safety management system

ED Decision 2019/021/R

COMMUNICATION ON SAFETY

- (a) The organisation should establish communication about safety matters that:
 - (1) ensures that all personnel are aware of the safety management activities as appropriate for their safety responsibilities;
 - (2) conveys safety-critical information, especially information related to assessed risks and analysed hazards;
 - (3) explains why particular actions are taken; and
 - (4) explains why safety procedures are introduced or changed.
- (b) Regular meetings with personnel, where information, actions, and procedures are discussed, may be used to communicate safety matters.

GM1 UAS.LUC.030(2)(g)(iv) Safety management system

ED Decision 2019/021/R

TRAINING AND SAFETY PROMOTION

Training, combined with safety communication and information sharing form part of safety promotion and supplement the organisation's policies, encouraging a positive safety culture and creating an environment that is favourable to the achievement of the organisation's safety objectives.

Safety promotion can also be the instrument for the development of a just culture.

Depending on the particular risk, safety promotion may constitute or complement a risk mitigation action and an effective reporting system.

AMC1 UAS.LUC.030(2)(g)(v) Safety management system

ED Decision 2022/002/R

COMPLIANCE MONITORING

- (a) The accountable manager should designate a manager to monitor the compliance of the LUC holder with:

- (1) the terms of approval, the privileges, the risk assessment and the resulting mitigation measures;
- (2) all operator's manuals and procedures; and
- (3) training standards.
- (b) The compliance monitoring manager should:
 - (1) have knowledge of, and experience in, compliance monitoring;
 - (2) have direct access to the accountable manager to ensure that findings are addressed, as necessary; and
 - (3) not be one of the other persons referred to in [UAS.LUC.030\(2\)\(d\)](#).
- (c) The tasks of the compliance monitoring manager may be performed by the safety manager, provided that the latter has knowledge of, and experience in, compliance monitoring.
- (d) The compliance monitoring function should include audits and inspections of the LUC holder. The audits and inspections should be carried out by personnel who are not responsible for the function, procedure or products being audited.
- (e) An organisation should establish an audit plan to show when and how often the activities as required by the UAS Regulation will be audited.
- (f) The independent audit should ensure that all aspects of compliance, including all the subcontracted activities, are checked within a period defined in the scheduled plan, and agreed by the competent authority.
- (g) Where the organisation has more than one approved location, the compliance monitoring function should describe how these locations are integrated into the system and include a plan to audit each location in a risk-based programme as agreed by the competent authority.
- (h) A report should be raised each time an audit is carried out, describing what was checked and the resulting findings against applicable requirements and procedures.
- (i) The feedback part of the compliance monitoring function should address who is required to rectify any non-compliance in each particular case, and the procedure to be followed if rectification is not completed within appropriate timescales. The procedure should lead to the accountable manager.
- (j) The LUC holder should be responsible for the effectiveness of the compliance monitoring function, in particular for the effective implementation and follow-up of all corrective measures.

GM1 UAS.LUC.030(2)(g)(v) Safety management system

ED Decision 2019/021/R

COMPLIANCE MONITORING

The primary objective of the compliance monitoring function is to enable the UAS operator to ensure a safe operation and to remain in compliance with the UAS Regulation.

An external organisation may be contracted to perform compliance monitoring functions. In such cases, that organisation should designate the compliance monitoring manager.

The compliance monitoring manager may use one or more auditors to carry out compliance audits and inspections of the LUC holder under their own responsibility.

AMC1 UAS.LUC.030(2)(g)(vi) Safety management system

ED Decision 2022/002/R

SAFETY RISK MANAGEMENT

The LUC holder should have a safety management system that is able to perform at least the following:

- (a) identify hazards through reactive, proactive, and predictive methodologies, using various data sources, including safety reporting and internal investigations;
- (b) collect, record, analyse, act on and generate feedback about hazards and the associated risks that affect the safety of the operational activities of the UAS operator;
- (c) develop an operational risk assessment as required by Article 11;
- (d) carry out internal safety investigations;
- (e) monitor and measure safety performance through safety reports, safety reviews, in particular during the introduction and deployment of new technologies, safety audits, including periodically assessing the status of safety risk controls, and safety surveys;
- (f) manage the safety risks related to a change, using a documented process to identify any external and internal change that may have an adverse effect on safety; the management of change should make use of the UAS operator's existing hazard identification, risk assessment, and mitigation processes;
- (g) manage the safety risks that stem from products or services delivered through subcontractors, by using its existing hazard identification, risk assessment, and mitigation processes, or by requiring that the subcontractors have an equivalent process for hazard identification and risk management; and
- (h) respond to emergencies using an ERP that reflects the size, nature, and complexity of the activities performed by the organisation, considering [AMC3 UAS.SPEC.030\(3\)\(e\)](#). The ERP should:
 - (1) contain the action to be taken by the UAS operator or the specified individuals in an emergency;
 - (2) provide for a safe transition from normal to emergency operations and vice versa;
 - (3) ensure coordination with the ERPs of other organisations, where appropriate; and
 - (4) describe emergency training/drills, as appropriate.

GM1 UAS.LUC.030(2)(g)(vi) Safety management system

ED Decision 2022/002/R

SAFETY RISK MANAGEMENT

In very broad terms, the objective of safety risk management is to eliminate risk, where practical, or reduce the risk (likelihood/severity) to acceptable levels, and to manage the remaining risk to avoid or mitigate any possible undesirable outcome. Safety risk management is, therefore, integral to the development and application of effective safety management.

Safety risk management can be applied at many levels in an organisation. It can be applied at the strategic level and at operational levels. The potential for human error, its influences and sources, should be identified and managed through the safety risk management process. Human factors risk

management should allow the organisation to determine where it is vulnerable to human performance limitations.

GM1 UAS.LUC.030(2)(g)(vii) Safety management system

ED Decision 2019/021/R

MANAGEMENT OF CHANGE

Unless properly managed, changes in organisational structures, facilities, the scope of work, personnel, documentation, policies and procedures, etc. can result in the inadvertent introduction of new hazards, which expose the organisation to new, or increased risk. Effective organisations seek to improve their processes, with conscious recognition that changes can expose the organisations to potentially latent hazards and risks if the changes are not properly and effectively managed.

Regardless of the magnitude of a change, large or small, proactive consideration should always be given to the safety implications. This is primarily the responsibility of the team that proposes and/or implements the change. However, change can only be successful if all the personnel affected by the change are engaged and involved, and they participate in the process. The magnitude of a change, its safety criticality, and its potential impact on human performance should be assessed in any change management process.

The process for the management of change typically provides principles and a structured framework for managing all aspects of the change. Disciplined application of change management can maximise the effectiveness of the change, engage staff, and minimise the risks inherent in change.

Change is the catalyst for an organisation to perform the hazard identification and risk management processes.

Some examples of change include, but are not limited to:

- (a) changes to the organisational structure;
- (b) a new type of UAS being employed;
- (c) additional UASs of the same or similar type being acquired;
- (d) significant changes in personnel (affecting key personnel and/or large numbers of personnel, high turn-over);
- (e) new or amended regulations;
- (f) changes in financial status;
- (g) new location(s), equipment, and/or operational procedures; and
- (h) new subcontractors.

A change may have the potential to introduce new human factors issues, or exacerbate pre-existing issues. For example, changes in computer systems, equipment, technology, personnel (including the management), procedures, the work organisation, or work processes are likely to affect performance.

The purpose of integrating human factors into the management of change is to minimise potential risks by specifically considering the impact of the change on the people within a system.

Special consideration, including any human factors issues, should be given to the 'transition period'. In addition, the activities utilised to manage these issues should be integrated into the change management plan.

Effective management of change should be supported by the following:

- (a) implementation of a process for formal hazard analyses/risk assessment for major operational changes, major organisational changes, changes in key personnel, and changes that may affect the way a UAS operation is carried out;
- (b) identification of changes likely to occur in business which would have a noticeable impact on:
 - (1) resources — material and human;
 - (2) management guidance — processes, procedures, training; and
 - (3) management control;
- (c) safety case/risk assessments that are focused on aviation safety; and
- (d) involvement of key stakeholders in the change management process as appropriate.

During the change management process, previous risk assessments and existing hazards are reviewed for possible effects.

GM1 UAS.LUC.030(2)(g)(viii) Safety management system

ED Decision 2022/002/R

SAFETY RISK MANAGEMENT — INTERFACES BETWEEN ORGANISATIONS

Safety risk management processes should specifically address the planned implementation of, or participation in, any complex arrangements (such as when multiple organisations are contracted, or when multiple levels of contracting/subcontracting are included).

Hazard identification and risk assessment start with the identification of all parties involved in the arrangement, including independent experts and non-approved organisations. This extends to the overall control structure, and assesses in particular the following elements across all subcontract levels and all parties within such arrangements:

- (a) coordination and interfaces between the different parties;
- (b) applicable procedures;
- (c) communication between all the parties involved, including reporting and feedback channels;
- (d) task allocation, responsibilities and authorities; and
- (e) the qualifications and competency of key personnel.

Safety risk management should focus on the following aspects:

- (a) clear assignment of accountability and allocation of responsibilities;
- (b) only one party is responsible for a specific aspect of the arrangement — there should be no overlapping or conflicting responsibilities, in order to eliminate coordination errors;
- (c) the existence of clear reporting lines, both for occurrence reporting and progress reporting; and
- (d) the possibility for staff to directly notify the organisation of any hazard by suggesting an obviously unacceptable safety risk as a result of the potential consequences of this hazard.

Regular communication between all parties to discuss work progress, risk mitigation actions, changes to the arrangement, as well as any other significant issues, should be ensured.

AMC1 UAS.LUC.030(2)(g)(ix) Safety management system

ED Decision 2019/021/R

USE OF SUBCONTRACTORS

- (a) When an LUC holder uses products or services delivered through a subcontractor that is not itself approved in accordance with this Subpart, the subcontractor should work under the terms of the LUC.
- (b) Regardless of the certification status of the subcontractor, the LUC holder is responsible for ensuring that all subcontracted products or services are subject to the hazard identification, risk management, and compliance monitoring of the LUC holder.

UAS.LUC.040 LUC manual

Regulation (EU) 2020/639

- (1) An LUC holder shall provide the competent authority with an LUC manual describing directly or by cross reference its organisation, the relevant procedures and the activities carried out.
- (2) The manual shall contain a statement signed by the accountable manager that confirms that the organisation will at all times work in accordance with this Regulation and with the approved LUC manual. When the accountable Manager is not the Chief Executive Officer of the organisation, the chief executive officer shall countersign the statement.
- (3) If any activity is carried out by partner organisations or subcontractors, the UAS operator shall include in the LUC manual procedures on how the LUC holder shall manage the relationship with those partner organisations or subcontractors.
- (4) The LUC manual shall be amended as necessary to retain an up-to-date description of the LUC holder's organisation, and copies of amendments shall be provided to the competent authority.
- (5) The UAS operator shall distribute the relevant parts of the LUC manual to all its personnel in accordance with their functions and duties.

AMC1 UAS.LUC.040 LUC manual

ED Decision 2019/021/R

GENERAL

- (a) The LUC holder should ensure that all personnel are able to understand the language in which those parts of the LUC manual which pertain to their duties and responsibilities are written.
- (b) The LUC manual should contain a statement signed by the accountable manager that confirms that the organisation will at all times work in accordance with the UAS Regulation, as applicable, and with the approved LUC manual. When the accountable manager is not the chief executive officer of the organisation, then the chief executive officer shall countersign the statement.

AMC2 UAS.LUC.040 LUC manual

ED Decision 2022/002/R

GENERAL

The LUC manual may contain references to the OM, where an OM is compiled in accordance with [AMC1 UAS.SPEC.030\(3\)\(e\)](#).

The LUC manual should contain at least the following information, customised according to the complexity of the UAS operator.

LUC MANUAL TEMPLATE

Operator's name

Table of contents

1. Introduction (*the information under Chapter 1 of the OM may be duplicated here or simply referenced in the OM*)
2. SMM
 - 2.1. Safety policy (*provide details of the UAS operator's safety policy, safety targets*)
 - 2.2. Organisational structure (*include the organogram and brief description thereof*)
 - 2.3. Duties and responsibilities of the accountable manager and key management personnel; (*in addition, clearly identify the person who authorises operations*)
 - 2.4. Safety management system (*provide a description of the safety management system, including the lines of responsibilities with regard to safety matters*)
 - 2.5. Operational control system (*provide a description of the procedures and responsibilities necessary to exercise operational control with respect to flight safety*)
 - 2.6. Compliance monitoring (*provide a description of the compliance monitoring function*)
 - 2.7. Safety risk management (*the information about hazard identification, safety risk assessment and mitigation under Chapter A of the OM may be duplicated here or simply referenced to the OM*)
 - 2.8. Management of change (*description of the process to identify safety-critical changes within the organisation and its operation and to eliminate or modify safety risk controls that are no longer needed or effective due to such changes*)
 - 2.9. Development and approval of an operational scenario (*provide a description of the process*)
 - 2.10. Interface with subcontractors and partners (*describe the relationship with any subcontractor delivering products or services to the UAS operator as well as with partners, if available*)
 - 2.11. Documentation of key management system processes
3. OM (*the information under Chapters 2-11 of the OM may be duplicated here or references to the OM may be provided*)
4. Handling, notifying and reporting accidents, incidents and occurrences
5. Handling of dangerous goods (*specify the relevant regulations and instructions to crew members concerning the transport of dangerous goods such as pesticides and chemicals, etc. and the use*)

of dangerous goods during operations such as batteries and fuel cells, engines, magnetising materials, pyrotechnics, flares and firearms)

AMC1 UAS.LUC.040(3) LUC manual

ED Decision 2019/021/R

PROCEDURES FOR SUBCONTRACTORS

If any activity is carried out by partner organisations or subcontractors, the LUC manual should include a relevant statement of how the LUC holder is able to ensure compliance with [UAS.LUC.030\(2\)\(i\)](#), and should contain, directly or by cross reference, descriptions of, and information on, the activities of those organisations or subcontractors, as necessary to substantiate this statement.

UAS.LUC.050 Terms of approval of the LUC holder

Regulation (EU) 2020/639

- (1) The competent authority shall issue an LUC after it is satisfied that the UAS operator complies with points [UAS.LUC.020](#), [UAS.LUC.030](#) and [UAS.LUC.040](#).
- (2) The LUC shall include:
 - (a) the UAS operator identification;
 - (b) the UAS operator's privileges;
 - (c) authorised type(s) of operation;
 - (d) the authorised area, zone or class of airspace for operations, if applicable;
 - (e) any special limitations or conditions, if applicable;

AMC1 UAS.LUC.050 Terms of approval of an LUC holder

ED Decision 2019/021/R

FORM FOR THE TERMS OF APPROVAL OF AN LUC HOLDER

LIGHT UAS OPERATOR CERTIFICATE (LUC) (Terms of approval of an LUC holder)		
⁽³⁾	State of the operator ⁽¹⁾ :	⁽³⁾
	Issuing competent authority ⁽²⁾ :	
LUC # ⁽⁴⁾ :	Operator name ⁽⁵⁾ : Registration number of the UAS operator ⁽⁶⁾ : Operator address ⁽⁸⁾ : Telephone ⁽⁹⁾ : Email ⁽¹⁰⁾ :	Contact details, at which operational management can be contacted without undue delay ⁽⁷⁾ :

This certificate certifies that⁽⁵⁾ is authorised to perform UAS operations, as defined in the attached UAS operations specifications, in accordance with the LUC manual, with the Annex to Regulation (EU) No 2019/947 and with Annex IX to Regulation (EU) 2018/1139.

Date of issue ⁽¹¹⁾: _____

Name and signature ⁽¹²⁾: _____

Title: _____

1. Enter the name of the State of the operator.
2. Enter the identification of the issuing competent authority.
3. Reserved for use of the competent authority.
4. Enter the approval reference (digital and/or letter code) of the LUC, as issued by the competent authority.
5. Enter the name of the legal entity of the UAS operator and UAS operator's trading name, if different from the name of the legal entity.
6. Enter the registration number of the UAS operator, provided according to Article 14 of the UAS Regulation.
7. Enter contact details such as the telephone numbers, including the country code, and the email address at which operational management can be contacted without undue delay for issues related to UAS operations, the airworthiness of UAS, remote crew competency and other matters as appropriate.
8. Enter the UAS operator's principal place of business address.
9. Enter the UAS operator's principal place of business telephone details, including the country code.
10. Enter the UAS operator's email.
11. Enter the issue date of the LUC (dd-mm-yyyy).
12. Enter the title, name and signature of the competent authority representative. In addition, an official stamp may be applied on the LUC.

UAS OPERATIONS SPECIFICATIONS

LUC ⁽¹⁾:

Operator name ⁽²⁾:

The UAS operator ⁽²⁾ _____ has the privilege to _____ ⁽³⁾, subject to the following:

UAS model ⁽⁴⁾: _____; UAS serial number or registration mark ⁽⁵⁾: _____

Type(s) of UAS operation ⁽⁶⁾ or :	Specifications ⁽⁷⁾ :	Special limitations ⁽⁸⁾ :	Remarks ⁽⁹⁾
1. _____;			
2. _____;			

Issuing competent authority ⁽¹⁰⁾:

Telephone⁽¹¹⁾:

Email⁽¹²⁾:

Date ⁽¹³⁾:

Signature⁽¹⁴⁾:

1. Enter the approval reference (digital and/or letter code) of the LUC, as issued by the competent authority.

2. Enter the name of the legal entity of the UAS operator and UAS operator's trading name, if different from the name of the legal entity.
3. Enter any privilege listed in AMC1 UAS.LUC.060 that has been granted.
4. Enter the UAS model.
5. Enter the UAS serial number or the UAS registration mark if applicable.
6. Specify the type(s) of UAS operation (e.g. STS, PDRA when applicable, or type of UAS operations in case the operation is not covered by an STS or a PDRA; the type of UAS operation may be: survey, linear inspection, urban delivery; agricultural, photography, advertising, calibration, construction work, stringing power line, aerial mapping, pollution control, news media, television and movie, flying display, competition, etc.).
7. Enter the relevant specifications describing where the operation is allowed to take place (area of operation or class of airspace for operations; maximum height, BVLOS/VLOS; range; etc.).
8. Enter the limitations related to: restriction of the ground area (i.e. controlled ground area, population density; ground risk buffer); the UAS performance and equipment (i.e. maximum speed; maximum weight etc.); data link or communications; external systems or loads; carriage of dangerous goods, possibility of handover, etc.
9. Enter remarks such as the remote pilot's competency; normal, contingency and emergency procedures.
10. Enter the identification of the issuing competent authority.
11. Enter the telephone number of the competent authority, including the country code.
12. Enter the email address of the competent authority.
13. Issue date of the operations specifications (dd-mm-yyyy).
14. Signature of the competent authority representative.

UAS.LUC.060 Privileges of the LUC holder

Regulation (EU) 2020/639

When satisfied with the documentation provided, the competent authority:

- (1) shall specify the terms and conditions of the privilege granted to the UAS operator in the LUC; and
- (2) may, within the terms of approval, grant to an LUC holder the privilege to authorise its own operations without:
 - (a) submitting an operational declaration;
 - (b) applying for an operational authorisation.

AMC1 UAS.LUC.060 Privileges of an LUC holder

ED Decision 2020/022/R

SCOPE OF PRIVILEGES

Within the terms of its approval, the LUC holder should be able:

- (a) without prior declaration to the competent authority, to authorise its own operations based on an STS; and

- (b) without prior approval of the competent authority, to authorise one or more of the following types of own operations:
- (1) one based on a PDRA that requires an authorisation;
 - (2) one based on one or more modifications of an STS (variants), which does not involve changes in the ConOps, the category of UAS used or the competencies of the remote pilots; or
 - (3) one that does not correspond to a PDRA, but falls within a type of activity already performed by the UAS operator.

In case of UAS operations that are conducted at SAIL V and VI, the competent authority requires the LUC holder to use a UAS with an EASA TC. In case of UAS operations that are conducted at SAIL III and IV, the competent authority specifies if the LUC holder is required to use a UAS with an EASA TC.

GM1 UAS.LUC.060 Privileges of an LUC holder

ED Decision 2020/022/R

GENERAL

For the purpose of granting privileges to LUC applicants, the competent authority may apply a gradual approach. Depending on the UAS operator's past safety performance and safety record over a defined period of time (e.g. the previous 6 months), the competent authority may expand the scope of the UAS operator's privileges.

The gradual approach should not be understood as preventing the competent authority from granting privileges with a greater scope to a first-time LUC applicant who has an adequate structure and competent personnel, an effective safety management system and has demonstrated a good compliance disposition.

For operations that are conducted at SAIL III and IV, and to facilitate harmonisation among EASA Member States, EASA recommends that the competent authority always requires LUC holders to use a UAS with an EASA TC.

UAS.LUC.070 Changes in the LUC management system

Regulation (EU) 2020/639

After an LUC is issued, the following changes require prior approval by the competent authority:

- (1) any change in the terms of approval of the UAS operator;
- (2) any significant change to the elements of the LUC holder's safety management system as required by point [UAS.LUC.030](#).

AMC1 UAS.LUC.070(2) Changes in the LUC management system

ED Decision 2019/021/R

CHANGES REQUIRING PRIOR APPROVAL

A change of the accountable manager is considered a significant change that requires a prior approval.

UAS.LUC.075 Transferability of an LUC

Regulation (EU) 2020/639

Except for the change to the ownership of the organisation, approved by the competent authority in accordance with point [UAS.LUC.070](#), an LUC is not transferable.

UAS.LUC.080 Duration and validity of an LUC

Regulation (EU) 2020/639

- (1) An LUC shall be issued for an unlimited duration. It shall remain valid subject to:
 - (a) the LUC holder's continuous compliance with the relevant requirements of this Regulation and of the Member State that issued the certificate; and
 - (b) it not being surrendered or revoked.
- (2) Upon revocation or surrender of an LUC, the LUC holder shall provide an acknowledgment in digital format that must be returned to the competent authority without delay.

UAS.LUC.090 Access

Regulation (EU) 2020/639

For the purpose of demonstrating compliance with this Regulation, the LUC holder shall grant any person, that is duly authorised by the competent authority, an access to any facility, UAS, document, records, data, procedures or to any other material relevant to its activity, which is subject to certification, operational authorisation or operational declaration, regardless of whether or not its activity is contracted or subcontracted to another organisation.

APPENDICES

Appendix 1 for standard scenarios supporting a declaration

Regulation (EU) 2020/639

CHAPTER I — 1 STS-01 - VLOS OVER A CONTROLLED GROUND AREA IN A POPULATED ENVIRONMENT

UAS.STS-01.010 General provisions

Regulation (EU) 2020/639

- (1) During flight, the unmanned aircraft shall be maintained within 120 m 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 m from an artificial obstacle taller than 105 metres, the maximum height of the UAS operation may be increased up to 15 m above the height of the obstacle at the request of the entity responsible for the obstacle.
- (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

Regulation (EU) 2020/639

- (1) UAS operations in STS-01 shall meet all of the following conditions:
 - (a) be conducted with the unmanned aircraft kept in VLOS at all times;
 - (b) be conducted in accordance with the operations manual referred to in point (1) of point [UAS.STS-01.030](#);
 - (c) be conducted over a controlled ground area comprising:
 - (i) for the operation of an untethered unmanned aircraft:
 - (A) the flight geography area;
 - (B) the contingency area, with its external limit(s) at least 10 m beyond the limit(s) of the flight geography area; and
 - (C) the ground risk buffer, which shall cover a distance beyond the external limit(s) of the contingency area that meets at least the following parameters:

	Minimum distance to be covered by the ground risk buffer for untethered unmanned aircraft	
Maximum height above ground	with an MTOM up to 10 kg	with an 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

- (ii) for operation of a tethered unmanned aircraft, a radius equal to the tether length plus 5 m and centred on the point where the tether is fixed over the surface of the earth.
 - (d) be conducted at a ground speed of less than 5 m/s in the case of untethered unmanned aircraft;
 - (e) be conducted by a remote pilot who:
 - (i) holds a certificate of remote pilot theoretical knowledge in accordance with [Attachment A](#) to this Chapter for operations in the standard scenarios issued by the competent authority or by an entity designated by the competent authority of a Member State;
 - (ii) holds an accreditation of completion of the STS-01 practical skill training, in accordance with [Attachment A](#) to this Chapter and issued by:
 - (A) an entity that has declared compliance with the requirements in [Appendix 3](#) and is recognised by the competent authority of a Member State; or
 - (B) an UAS operator that has declared to the competent authority of the Member State of registration, compliance with STS-01 and that has declared compliance with the requirements in [Appendix 3](#); and
 - (f) be conducted 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 system.
- (2) The remote pilot shall obtain the certificate of theoretical knowledge for operations in the standard scenarios after:
- (a) 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
 - (b) having passed an additional theoretical knowledge examination provided by the competent authority or by an entity designated by the competent authority of a Member State in accordance with [Attachment A](#) to this Chapter.
- (3) This certificate shall be valid for five years. The revalidation, within its validity period is subject to any of the following:
- (a) the demonstration of competencies in accordance with point (2);
 - (b) the completion of a refresher training addressing the theoretical knowledge subjects as defined in point (2) provided by the competent authority or by an entity designated by the competent authority.
- (4) In order to revalidate the certificate upon its expiration, the remote pilot shall comply with point (2).

GM1 UAS.STS-01.020(1)(c) UAS operations in STS-01

ED Decision 2022/002/R

GROUND RISK BUFFER

The values for determining the size of the ground risk buffer that are indicated in the table of point [UAS.STS-01.020\(1\)\(c\)\(i\)\(C\)](#) should be considered as minimum values. However, additional margins

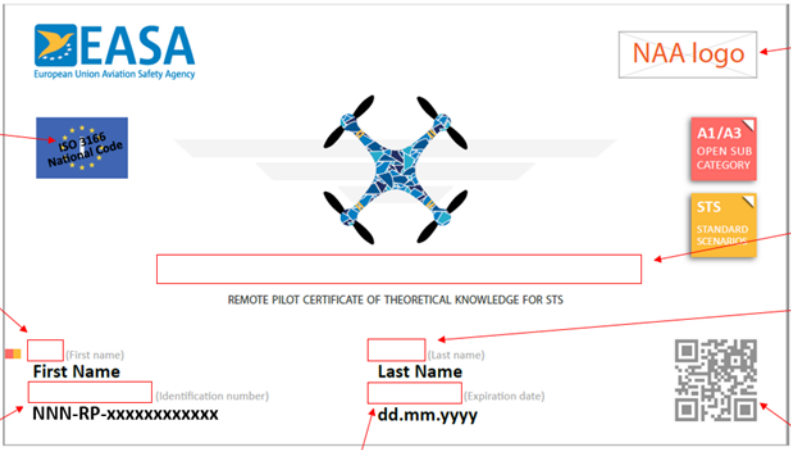
should be considered depending on factors that may increase the distance travelled by the UA, e.g. UA flight characteristics, such as autorotation capability, wind, remote pilot's reaction time, etc.

AMC1 UAS.STS-01.020(1)(e)(i) UAS operations in STS-01 and UAS.STS-02.020(7)(a) UAS operations in STS-02

ED Decision 2022/002/R

CERTIFICATE OF REMOTE PILOT THEORETICAL KNOWLEDGE

Upon receipt of proof that the remote pilot has successfully completed the theoretical knowledge examination, the competent authority or the entity that is designated by the competent authority should provide the remote pilot with a certificate of remote pilot theoretical knowledge in the format that is depicted in the figure below. The certificate may be provided in electronic form.



Instructions for Certificate Fields:

- Top Left:** Insert in the ISO 3166 National Code in the centre of the EU flag
- Top Right:** Insert here the national competent authority logo
- Right Side (Red Box):** Insert the words 'Remote pilot certificate of theoretical knowledge for STS' in the MS national language
- Right Side (Yellow Box):** Insert here the words 'Last name' in the MS national language
- Bottom Left (First Name):** Insert here the words 'First name' in the MS national language
- Bottom Left (Identification Number):** Insert here the words 'Identification number' in the MS national language
- Bottom Right (Last Name):** Insert here the words 'Last name' in the MS national language
- Bottom Right (Expiration Date):** Insert here the words 'Expiration date' in the MS national language
- Bottom Right (QR Code):** Insert a QR code providing a link to the national database where the information related to the remote pilot is stored

Fields to be filled:

- First Name:** [Field]
- Last Name:** [Field]
- Identification Number:** NNN-RP-xxxxxxxxxxx
- Expiration Date:** dd.mm.yyyy

The remote pilot identification number that is provided by the competent authority, or the entity that is designated by the competent authority, which issues the certificate of remote pilot theoretical knowledge should have the following format:

NNN-RP-xxxxxxxxxxx

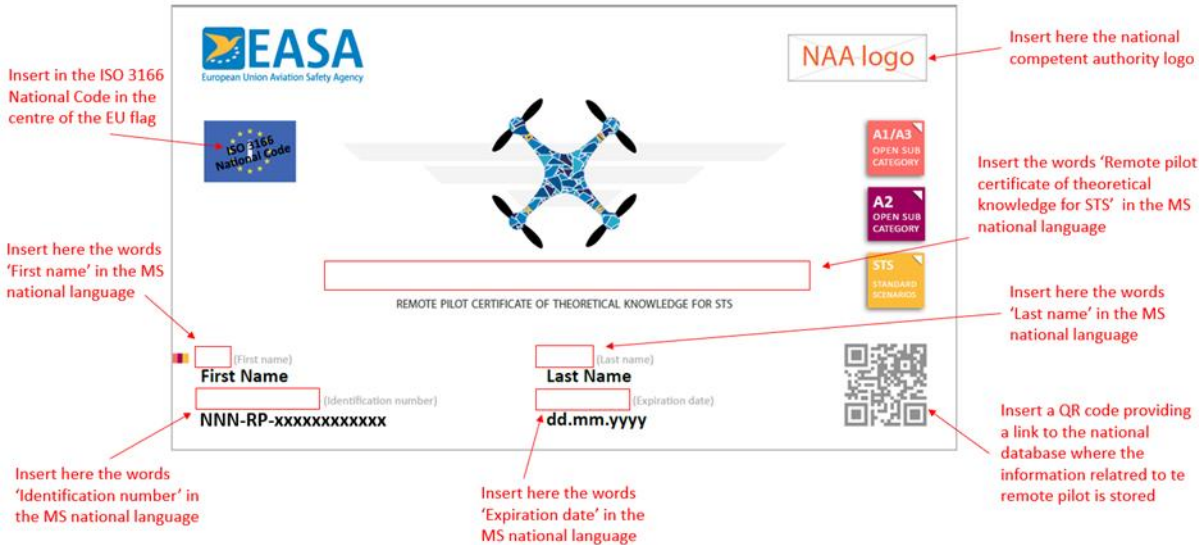
Where:

- 'NNN' is the ISO 3166 Alpha-3 code of the competent authority that issues the proof of completion;
- 'RP' is a fixed field meaning 'remote pilot'; and
- 'xxxxxxxxxxx' are 12 alphanumeric characters (lower-case only) defined by the competent authority that issues the proof of completion.

Example: (FIN-RP-123456789abc)

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

If the remote pilot provides the declaration of the practical-skills self-training as defined in point [UAS.OPEN.030\(2\)\(c\)](#), before passing the theoretical knowledge examination, the competent authority may include in the certificate also 'subcategory A2'.



Insert in the ISO 3166 National Code in the centre of the EU flag

Insert here the words 'First name' in the MS national language

Insert here the words 'Identification number' in the MS national language

Insert here the words 'Expiration date' in the MS national language

Insert here the national competent authority logo

Insert the words 'Remote pilot certificate of theoretical knowledge for STS' in the MS national language

Insert here the words 'Last name' in the MS national language

Insert a QR code providing a link to the national database where the information related to the remote pilot is stored

AMC1 UAS.STS-01.020(1)(e)(ii) UAS operations in STS-01 and UAS.STS-02.020(7)(b) UAS operations in STS-02

ED Decision 2022/002/R

REMOTE PILOT PRACTICAL TRAINING FOR STSs

The instructor should gradually compile a 'progress booklet' to allow the monitoring of the training and the continuous evaluation of the practical skills of the student remote pilot.

The progress booklet should be signed by the student remote pilot at the end of each practical training cycle. A record of the booklet should be kept for 5 years.

When the student remote pilot reaches the desired level of competence, the organisation that provides the practical training issues an attestation of practical training.

GM1 UAS.STS-01.020(1)(e)(ii) UAS operations in STS-01 and UAS.STS-02.020(7)(b) UAS operations in STS-02

ED Decision 2022/002/R

REMOTE PILOT PRACTICAL TRAINING FOR STSs

Practical training for STSs is provided as a 'continuous evaluation' of the student remote pilot by:

- (1) either a UAS operator that has declared compliance with:
 - (a) the relevant STS(s) (the one(s) for which training and assessment are provided); and
 - (b) the requirements of [Appendix 3](#) to the Annex to the UAS Regulation; or
- (2) an entity that has declared compliance with the requirements of [Appendix 3](#) to the Annex to the UAS Regulation.

UAS.STS-01.030 Responsibilities of the UAS operator

Regulation (EU) 2020/639

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 any of the following:
 - (a) dedicated flight tests;
 - (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;
 - (c) the criteria to identify an emergency situation;
 - (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 function 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 point [UAS.STS-01.020\(1\)\(C\)\(i\)\(C\)](#) 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:

- (a) the UAS is accompanied by the corresponding EU declaration(s) of conformity, including the reference to class C5 or reference to class C3 and to the accessories kit; and
- (b) the class C5 identification label is affixed to the unmanned aircraft or to the accessories kit.

AMC1 UAS.STS-01.030(1)&(3) and UAS.STS-02.030(1)&(3) Responsibilities of the UAS operator

ED Decision 2022/002/R

OPERATIONAL PROCEDURES

The UAS operator should comply with the conditions for a 'medium' level of robustness of [AMC2 UAS.SPEC.030\(3\)\(e\)](#) as regards:

- the operational procedures contained in the OM, indicated in [UAS.STS-01.030\(1\)](#) and [UAS.STS-02.030\(1\)](#); and
- the contingency and emergency procedures, indicated in [UAS.STS-01.030\(3\)](#) and [UAS.STS-02.030\(3\)](#).

The flight test to verify the adequacy of the contingency and emergency procedures may be conducted in subcategory A3 of the 'open' category. In that case, the UAS operator should ensure that the UAS operation complies with the 'open' category requirements.

AMC1 UAS.STS-01.030(4) and UAS.STS-02.030(4) Responsibilities of the UAS operator

ED Decision 2022/002/R

EMERGENCY RESPONSE PLAN (ERP)

The UAS operator should develop an ERP in compliance with the conditions for a 'medium' level of robustness as per [AMC3 UAS.SPEC.030\(3\)\(e\)](#).

GM1 UAS.STS-01.030(5)&(6) and UAS.STS-02.030(5)&(6) Responsibilities of the UAS operator

ED Decision 2022/002/R

EXTERNALLY PROVIDED SERVICES

'External service' should be understood as any service that is provided by an external service provider to the UAS operator and which is:

- necessary to ensure the safety of a UAS operation; and
- provided by a service provider other than the UAS operator.

UAS.STS-01.040 Responsibilities of the remote pilot

Regulation (EU) 2024/1110

In addition to the responsibilities defined in [UAS.SPEC.060](#), the remote pilot:

- (1) before starting an UAS operation, shall verify that the means to terminate the flight of the unmanned aircraft are operational and check if the direct remote identification is active and up-to-date;
- (2) during the flight:
 - (a) shall keep the unmanned aircraft in VLOS and maintain a thorough airspace 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), may be assisted by an unmanned aircraft observer. In such case, clear and effective communication shall be established between the remote pilot and the unmanned aircraft observer;
 - (c) shall have the ability to maintain control of the unmanned aircraft, except in the case of a lost command and control (C2) link;
 - (d) shall operate only one unmanned aircraft at a time;
 - (e) shall not operate the unmanned aircraft from a moving vehicle;
 - (f) shall not hand over the control of the unmanned aircraft to another CMU;
 - (g) shall 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) shall 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.

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

Regulation (EU) 2020/639

(1) Theoretical knowledge examination

- (a) The examination referred in point (2)(b) 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 scenario shall cover at least the subjects and areas identified in Table 1:

Table 1

Subjects and areas to be covered for practical skill training and assessment

Subject	Areas to be covered
(a) Pre-flight actions	(i) Operation planning, 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) identify whether the wind speed and/or direction may be affected by topography or by obstacles in the operational volume; (E) select relevant data on airspace information (including on UAS geographical zones) that can have an impact on the intended operation; (F) make sure the UAS is suitable for the intended operation; (G) make sure that the selected payload is compatible with the UAS used for the operation; (H) 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; (I) implement the necessary procedures to operate in controlled airspace, including a protocol to communicate

	with ATC and obtain clearance and instructions, if necessary; (J) confirm that all the necessary documents for the intended operation are on site; and (K) brief 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 operational; (H) check the correct functioning of the command and control link; (I) activate the geo-awareness function and upload the information to it (if geo-awareness function 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) Maintain an effective look-out and keep 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) Perform accurate and controlled flight manoeuvres at different heights and distances representative of the corresponding STS (including flight in manual/non-GNSS assisted mode or 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. Flight under abnormal conditions: (A) manage 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; (C) manage a situation in which the unmanned aircraft positioning equipment is impaired; (D) manage a situation of an incursion by a person not involved into the operational volume or the controlled ground area, and take appropriate measures to maintain safety; (E) react to, and take the appropriate corrective actions for a situations where the unmanned aircraft is likely to exceed the limit of the flight geography (contingency procedures) and from the operational volume (emergency procedures) as defined during the flight preparation; (F) manage the situation when an 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) Shut down and secure 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.

CHAPTER II — STS-02 – BVLOS WITH AIRSPACE OBSERVERS OVER A CONTROLLED GROUND AREA IN A SPARSELY POPULATED ENVIRONMENT

UAS.STS-02.010 General provisions

Regulation (EU) 2020/639

- (1) During flight, the unmanned aircraft shall be maintained within 120 m from the closest point of the surface of the earth. The measurement of distances shall be adapted according to the geographical characteristics of the terrain, such as plains, hills, mountains.
- (2) When flying an unmanned aircraft within a horizontal distance of 50 m from an artificial obstacle taller than 105 m, the maximum height of the UAS operation may be increased up to 15 m above the height of the obstacle at the request of the entity responsible for the obstacle.
- (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

Regulation (EU) 2020/639

UAS operations in STS-02 shall be conducted:

- (1) in accordance with the operations manual referred to in point (1) of point [UAS.STS-02.030](#);
- (2) over a controlled ground area entirely located in a sparsely populated environment including:
 - (a) the flight geography area,
 - (b) the contingency, which its external limit(s) shall be located at least 10 m beyond the limit(s) of the flight geography area,
 - (c) a ground risk buffer covering a distance that is at least equal to the distance most likely to be travelled by the UA after activation of the means to terminate the flight specified by the UAS manufacturer in manufacturer's instructions, considering the operational conditions within the limitations specified by the UAS manufacturer;
- (3) in an area where the minimum flight visibility is more than 5 km;
- (4) with the unmanned aircraft in sight of the remote pilot during the launch and recovery of the unmanned aircraft, unless the latter is the result of an emergency flight termination;
- (5) if no airspace observer is used in the operation, 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 airspace observers are used in the operation, it shall comply with all of the following conditions:
 - (a) the airspace observer(s) are positioned in a manner allowing for an adequate coverage of the operational volume and the surrounding airspace with the minimum flight visibility indicated in point (3);
 - (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 airspace observer who is nearest to the unmanned aircraft;
 - (d) the distance between any airspace observer and the remote pilot is not more than 1 km;
 - (e) robust and effective communication means are available for the communication between the remote pilot and the airspace observer(s);
- (7) by a remote pilot who holds:
- (a) a certificate of remote pilot theoretical knowledge for operations in standard scenarios, issued by the competent authority or by an entity designated by the competent authority of a Member State;
 - (b) an accreditation of completion of the STS-02 practical skill training, in accordance with [Attachment A](#) to this Chapter and issued by:
 - (A) an entity that has declared compliance with the requirements in [Appendix 3](#) and is recognised by the competent authority of a Member State; or
 - (B) by an UAS operator that has declared to the competent authority of the Member State of registration, compliance with STS-02 and that has declared compliance with the requirements in [Appendix 3](#);
- (8) with an unmanned aircraft which complies with all of the following conditions:
- (a) is marked as class C6 and complies with the requirements of that class, as defined in [Part 17](#) of the Annex to Delegated Regulation (EU) 2019/945;
 - (b) is operated with an active system to prevent the unmanned aircraft from breaching the flight geography;
 - (c) is operated with active and updated direct remote identification system.
- (9) The remote pilot shall obtain the certificate of theoretical knowledge for operations in the standard scenarios after:
- (a) 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
 - (b) having passed an additional theoretical knowledge examination provided by the competent authority or by an entity designated by the competent authority of a Member State in accordance with [Attachment A](#) to this Chapter.
- (10) This certificate shall be valid for five years. The revalidation, within its validity period is subject to any of the following:
- (a) the demonstration of competencies in accordance with point (9);
 - (b) the completion of a refresher training addressing the theoretical knowledge subjects as defined in point (9) provided by the competent authority or by an entity designated by the competent authority;
- (11) In order to revalidate the certificate upon its expiration, the remote pilot shall comply with point (9).

GM1 UAS.STS-02.020(3) UAS operations in STS-02

ED Decision 2022/002/R

FLIGHT VISIBILITY

Point [UAS.STS-02.020\(3\)](#) requires a minimum flight visibility of 5 km to ensure that the remote pilot and/or the AO(s) can adequately visually scan the operational volume and surrounding airspace to detect well in advance any incoming manned aircraft and identify any risk of collision with that aircraft.

'Flight visibility' should be understood as the shortest distance from the remote pilot's position, or from the position of each of the AOs (if employed), at which unlighted objects may be seen and identified at day and prominently lighted objects may be seen and identified at night. It should be considered in all directions.

Before starting the intended UAS operation, the UAS operator should gather all relevant information that may affect the UAS flight visibility.

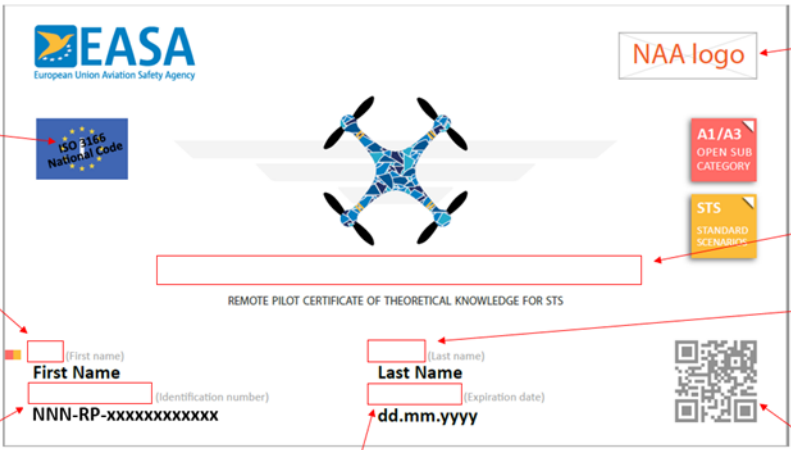
Other aspects that should be considered are, for example, the light conditions (including the sun or other intense lights that may blind the remote pilot and/or the AO(s)), the presence of natural or artificial obstacles, the cloud ceiling level, the presence of smoke, etc.

AMC1 UAS.STS-01.020(1)(e)(i) UAS operations in STS-01 and UAS.STS-02.020(7)(a) UAS operations in STS-02

ED Decision 2022/002/R

CERTIFICATE OF REMOTE PILOT THEORETICAL KNOWLEDGE

Upon receipt of proof that the remote pilot has successfully completed the theoretical knowledge examination, the competent authority or the entity that is designated by the competent authority should provide the remote pilot with a certificate of remote pilot theoretical knowledge in the format that is depicted in the figure below. The certificate may be provided in electronic form.



Insert in the ISO 3166 National Code in the centre of the EU flag

Insert here the words 'First name' in the MS national language

Insert here the words 'Identification number' in the MS national language

Insert here the words 'Last name' in the MS national language

Insert here the words 'Expiration date' in the MS national language

Insert here the national competent authority logo

Insert the words 'Remote pilot certificate of theoretical knowledge for STS' in the MS national language

Insert a QR code providing a link to the national database where the information related to the remote pilot is stored

REMOTE PILOT CERTIFICATE OF THEORETICAL KNOWLEDGE FOR STS

First Name (First name)
NNN-RP-xxxxxxxxxxxxx (Identification number)

Last Name (Last name)
dd.mm.yyyy (Expiration date)

A1/A3 OPEN SUB CATEGORY

STS STANDARD SCENARIO

The remote pilot identification number that is provided by the competent authority, or the entity that is designated by the competent authority, which issues the certificate of remote pilot theoretical knowledge should have the following format:

NNN-RP-xxxxxxxxxxxx

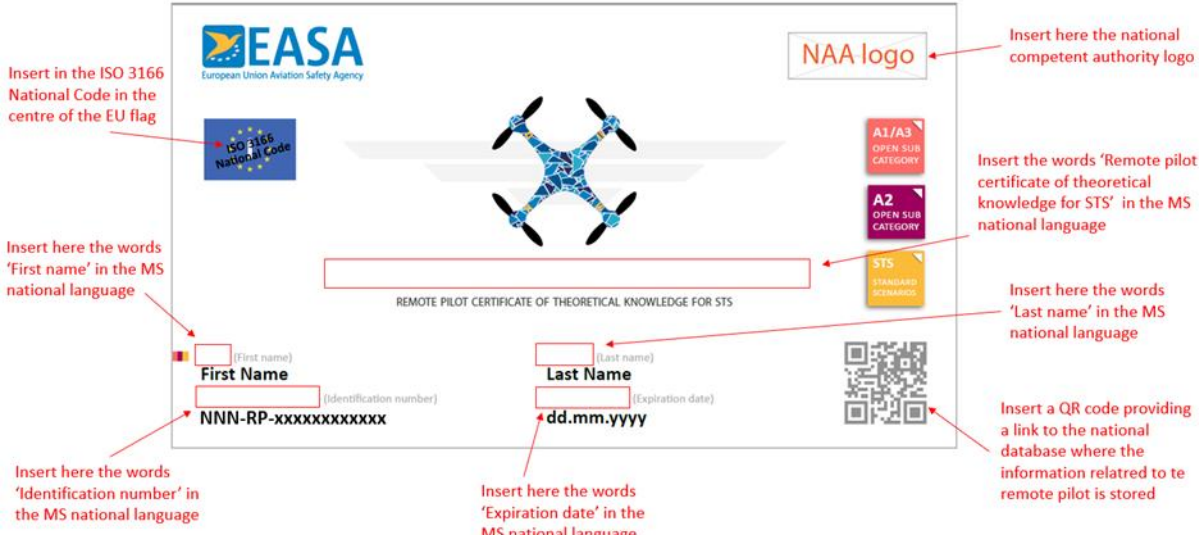
Where:

- 'NNN' is the ISO 3166 Alpha-3 code of the competent authority that issues the proof of completion;
- 'RP' is a fixed field meaning 'remote pilot'; and
- 'xxxxxxxxxxxx' are 12 alphanumeric characters (lower-case only) defined by the competent authority that issues the proof of completion.

Example: (FIN-RP-123456789abc)

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

If the remote pilot provides the declaration of the practical-skills self-training as defined in point [UAS.OPEN.030\(2\)\(c\)](#), before passing the theoretical knowledge examination, the competent authority may include in the certificate also 'subcategory A2'.



Insert in the ISO 3166 National Code in the centre of the EU flag

Insert here the words 'First name' in the MS national language

Insert here the words 'Identification number' in the MS national language

Insert here the words 'Expiration date' in the MS national language

Insert here the national competent authority logo

Insert the words 'Remote pilot certificate of theoretical knowledge for STS' in the MS national language

Insert here the words 'Last name' in the MS national language

Insert a QR code providing a link to the national database where the information related to the remote pilot is stored

AMC1 UAS.STS-01.020(1)(e)(ii) UAS operations in STS-01 and UAS.STS-02.020(7)(b) UAS operations in STS-02

ED Decision 2022/002/R

REMOTE PILOT PRACTICAL TRAINING FOR STSs

The instructor should gradually compile a 'progress booklet' to allow the monitoring of the training and the continuous evaluation of the practical skills of the student remote pilot.

The progress booklet should be signed by the student remote pilot at the end of each practical training cycle. A record of the booklet should be kept for 5 years.

When the student remote pilot reaches the desired level of competence, the organisation that provides the practical training issues an attestation of practical training.

GM1 UAS.STS-01.020(1)(e)(ii) UAS operations in STS-01 and UAS.STS-02.020(7)(b) UAS operations in STS-02

ED Decision 2022/002/R

REMOTE PILOT PRACTICAL TRAINING FOR STSs

Practical training for STSs is provided as a 'continuous evaluation' of the student remote pilot by:

- (1) either a UAS operator that has declared compliance with:
 - (a) the relevant STS(s) (the one(s) for which training and assessment are provided); and
 - (b) the requirements of [Appendix 3](#) to the Annex to the UAS Regulation; or
- (2) an entity that has declared compliance with the requirements of [Appendix 3](#) to the Annex to the UAS Regulation.

UAS.STS-02.030 Responsibilities of the UAS operator

Regulation (EU) 2020/639

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 of both the volume and the buffer;
- (3) ensure the adequacy of the contingency and emergency procedures through any of the following:
 - (a) dedicated flight tests;
 - (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 the escalating effects of the emergency situation;
 - (b) the conditions to alert the relevant authorities and organisations;

- (c) the criteria to identify an emergency situation;
 - (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 function is installed on the UAS, when required by the UAS geographical zone for the intended location of the operation;
- (8) ensure that, before starting the operation, all appropriate measures to reduce the risk of intrusion of uninvolved persons in the controlled ground area compliant with the minimum distance defined in point [UAS.STS-02.020](#)(2) have been taken 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 airspace observers are used:
 - (a) ensure the correct placement and number of airspace observers along the intended flight path;
 - (b) verify:
 - (i) that the visibility and the planned distance of the airspace observer are within acceptable limits as defined in the operations manual;
 - (ii) the absence of potential terrain obstructions for each airspace observer;
 - (iii) that there are no gaps between the zones covered by each of the airspace observers;
 - (iv) that the communication with each airspace observer is established and effective;
 - (v) that if means are used by the airspace observers to determine the position of the unmanned aircraft, those means are functioning and effective;
 - (c) ensure that the airspace observers have been briefed on the intended path of the unmanned aircraft and the associated timing;
- (11) ensure that:
 - (a) the UAS is accompanied by the corresponding EU declaration of conformity, including the reference to class C6;
 - (b) the class C6 identification label is affixed to the unmanned aircraft.

AMC1 UAS.STS-01.030(1)&(3) and UAS.STS-02.030(1)&(3) Responsibilities of the UAS operator

ED Decision 2022/002/R

OPERATIONAL PROCEDURES

The UAS operator should comply with the conditions for a 'medium' level of robustness of [AMC2 UAS.SPEC.030\(3\)\(e\)](#) as regards:

- the operational procedures contained in the OM, indicated in [UAS.STS-01.030\(1\)](#) and [UAS.STS-02.030\(1\)](#); and
- the contingency and emergency procedures, indicated in [UAS.STS-01.030\(3\)](#) and [UAS.STS-02.030\(3\)](#).

The flight test to verify the adequacy of the contingency and emergency procedures may be conducted in subcategory A3 of the 'open' category. In that case, the UAS operator should ensure that the UAS operation complies with the 'open' category requirements.

AMC1 UAS.STS-01.030(4) and UAS.STS-02.030(4) Responsibilities of the UAS operator

ED Decision 2022/002/R

EMERGENCY RESPONSE PLAN (ERP)

The UAS operator should develop an ERP in compliance with the conditions for a 'medium' level of robustness as per [AMC3 UAS.SPEC.030\(3\)\(e\)](#).

GM1 UAS.STS-01.030(5)&(6) and UAS.STS-02.030(5)&(6) Responsibilities of the UAS operator

ED Decision 2022/002/R

EXTERNALLY PROVIDED SERVICES

'External service' should be understood as any service that is provided by an external service provider to the UAS operator and which is:

- necessary to ensure the safety of a UAS operation; and
- provided by a service provider other than the UAS operator.

UAS.STS-02.040 Responsibilities of the remote pilot

Regulation (EU) 2024/1110

In addition to the responsibilities defined in [UAS.SPEC.060](#), the remote pilot shall:

- (1) before starting an UAS operation:
 - (a) set the programmable flight volume of the unmanned aircraft to keep it within the flight geography;
 - (b) verify that the means to terminate the flight and the programmable operational volume functionality of the unmanned aircraft are operational; and, check if the direct remote identification is active and up-to-date.

- (2) during flight:
- (a) unless supported by airspace observers, maintain a thorough airspace 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 (C2) link;
 - (c) operate only one unmanned aircraft at a time;
 - (d) not operate the unmanned aircraft from a moving vehicle;
 - (e) shall not hand over the control of the unmanned aircraft to another CMU;
 - (f) inform the airspace 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;
 - (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 airspace observer

Regulation (EU) 2020/639

An airspace observer shall:

- (1) maintain a thorough airspace scan of the airspace surrounding the unmanned aircraft in order to identify any risk of a collision with any manned aircraft;
- (2) maintain awareness of the position of the unmanned aircraft through direct airspace observation or through assistance provided by electronic means;
- (3) alert the remote pilot when a hazard is detected and assist in avoiding or minimising the potential negative effects.

AMC1 UAS.STS-02.050(2) Responsibilities of the airspace observer

ED Decision 2022/002/R

MAINTAINING AWARENESS OF THE UA

The airspace observer should be provided with clear and concise information on the geographical position of the UA, its speed, and its height above the surface or take-off point.

The airspace observer may use the same system provided to the remote pilot to comply with the requirement in [Part 17 point \(3\)](#) of the UAS Regulation.

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

Regulation (EU) 2020/639

(1) Theoretical knowledge examination

The examination shall be defined in accordance with point 1 of [Attachment A](#) to Chapter I.

(2) Practical skill training and assessment

In addition to the areas defined in point A.2 of [Attachment A](#) to Chapter I, the following areas shall be covered:

Table 1

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

Subject	Areas to be covered
(a) BVLOS operations conducted under STS-02	(i) Pre-flight actions — operation planning, airspace considerations and site risk-assessment. The following points are to be included: (A) airspace scanning; (B) operations with airspace observers (AOs): adequate placement of AOs, and a deconfliction scheme that includes phraseology, coordination and communications means; (ii) The in-flight procedures, defined in point 2.(b)(ii) of Attachment A to Chapter I, shall be performed in both VLOS and BVLOS.

Appendix 2 — Operational declaration

Regulation (EU) 2020/639

	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 Commission Implementing 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			
UAS manufacturer			
UAS model			
UAS Serial number			
I hereby declare that: — I comply with all the applicable provisions of Implementing 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	

GM1 Appendix 2 Operational declaration

ED Decision 2022/002/R

OPERATIONAL DECLARATION FORM: UAS MANUFACTURER, UAS MODEL AND UAS SERIAL NUMBER

If the UAS operator intends to conduct UAS operations that are covered by the STS that uses different UASs (not used at the same time in the same location and all bearing the appropriate class identification label), the UAS operator is not required to submit a separate operational declaration form for each UAS.

In such a case, the information on the 'UAS manufacturer', the 'UAS model', and the 'UAS serial number' for each UAS should be provided in the corresponding fields of the operational declaration form. For example, for two different UASs from different manufacturers:

	UAS manufacturer	UAS model	UAS serial number
UAS #1			
UAS #2			

If the UAS operator intends to provide practical-skills training and conduct practical-skills assessments of remote pilots that operate in an STS, information on the manufacturer, the model, and the serial number of the UAS that is used for such training and assessment should also be included in the operational declaration form even if the UAS is used only for training and assessment purposes.

Appendix 3 — Additional requirements for entities recognised by the competent authority and UAS operators that conduct practical skill training and assessment of remote pilots for operations covered by STS

Regulation (EU) 2020/639

An entity that intends to be recognised by the competent authority for conducting practical skill training and assessment of remote pilots for an STS, shall declare to the competent authority compliance with the following requirements using the declaration form in [Appendix 6](#).

An UAS operator that intends to conduct practical skill training and assessment of remote pilots for an 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 competent authority or the UAS operator intends to conduct practical skill training and assessment of remote pilots for an STS in a Member State other than the Member State of registration, a copy of the declaration form in [Appendix 4](#) shall be submitted to the competent authority of the Member State where the training is conducted.

If an entity recognised by the competent authority intends to conduct practical skill training and assessment of remote pilots for an STS in a Member State other than the Member State of recognition, a proof of the recognition shall be submitted to the competent authority of the Member State where the training is conducted.

- (1) The entity recognised by the competent authority or the UAS operator shall ensure a clear separation between the training activities and any other operational activity to guarantee the independence of the evaluation.
- (2) The entity recognised by the competent authority or 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 entity recognised by the competent authority or 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;
 - (b) be impartial and shall not participate in assessments if they feel that their objectivity may be affected;
 - (c) 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 as well as adequate experience of such processes;
 - (d) have the ability to administer the declarations, records and reports that demonstrate that the relevant practical skill assessments have been carried out and to draw the conclusions of those practical skill assessments; and

- (e) 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 Chapter.
- (6) The practical skill training and assessment location(s) shall be conducted in an environment representative of the conditions of the STS.
- (7) The practical skill assessment shall consist of a continuous evaluation of the student remote pilot.
- (8) The entity recognised by the competent authority or 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) An accreditation of completion of the practical skill training for the STS shall be delivered to the student remote pilot by entity recognised by the competent authority or 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 accreditation of completion of point (9) shall be notified to the competent authority of the Member State where the practical skill training and assessment are conducted including the student remote pilot's identification details, the STS covered, the date of issuance and the identification details of the entity recognised by the competent authority of a Member State or the UAS operator issuing it.
- (11) The entity recognised by the competent authority or 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 Chapter;
- (c) a description of the UAS and any other equipment, tools and environment used for the practical skill training and assessment; and
- (d) a template for the assessment report.

Appendix 4 — Declaration of UAS operators that intend to provide practical skill training and assessment of remote pilots in STS-x

Regulation (EU) 2020/639

	STS-x		
	Declaration of UAS operators that intend 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 Commission 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 STS-x; I comply with the requirements defined in Appendix 3 to the Annex to Implementing Regulation (EU) 2019/947; and when operating an UAS in the context of training activities for STS.x, I comply with all the applicable provisions of Implementing Regulation (EU) 2019/947, including requirements for operations under STS.x			
Date		Signature or other verification	

Appendix 5 — Operations manual for Standard Scenario

Regulation (EU) 2020/639

The operations manual for STS defined in [Appendix 1](#) shall contain at least the following:

- (1) a statement that the operations manual complies with the relevant requirements of this Regulation 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.;
 - (ii) the characteristics of the airspace to be used;
 - (iii) the environmental conditions including at least the weather and the electromagnetic environment;
 - (iv) 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.;
 - (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 manufacturer's instructions 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 persons who are not involved 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 from 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 airspace 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 designated '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 airspace observers are employed, the phraseology to be used;

- (vi) conflict avoidance procedures 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;
 - (iii) procedures for the emergency recovery of the unmanned aircraft;
- (f) security procedures as referred to in point (1)(a)(ii) and (iii) of point [UAS.SPEC.050](#);
- (g) the procedures for the protection of personal data referred to in point (1)(a)(iv) of point [UAS.SPEC.050](#);
- (h) the guidelines to minimise nuisance and environmental impact referred to in point (1)(a)(v) of point [UAS.SPEC.050](#);
- (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.

Appendix 6 — Declaration of the entity intending to be recognised by the competent authority to provide practical skill training and assessment of remote pilots in STS-x

Regulation (EU) 2020/639

	STS-x		
	Declaration of the entity intending to be recognised by the competent authority 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.			
Identification of the entity			
First and last name, telephone number and email address of the responsible person			
I hereby declare that: I comply with the requirements defined in Appendix 3 to the Annex to Regulation (EU) 2019/947; and when operating an UAS in the context of training activities for STS.x, I comply with all the applicable provisions of Regulation (EU) 2019/947, including requirements for operations under STS.x			
Date		Signature or other verification	

COVER REGULATION TO DELEGATED REGULATION (EU) 2019/945

**COMMISSION DELEGATED REGULATION (EU) 2019/945
of 12 March 2019**

on unmanned aircraft systems and on third-country operators of unmanned aircraft systems

Regulation (EU) 2019/945

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 3922/91¹, and in particular Article 58 and Article 61 thereof,

Whereas:

- (1) The unmanned aircraft systems ('UAS') whose operation presents the lowest risks and that belong to the 'open' category of operations 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.
- (3) When manufacturers place a UAS on the market with the intention to make it available for operations under the 'open' category and therefore affix a class identification label on it, they should ensure compliance of the UAS with the requirements of that class.
- (4) Considering the good level of safety achieved by model aircraft already made available on the market, it is appropriate to create the C4 class of UAS which should not be subject to disproportionate technical requirements for the benefit of model aircraft operators.
- (5) This Regulation should also apply to UAS, which are considered as toys within the meaning of Directive 2009/48/EC of the European Parliament and of the Council². Those UAS should also comply with Directive 2009/48/EC. That compliance requirement should be taken into account when defining additional safety requirements under this Regulation.
- (6) UAS that are not toys within the meaning of Directive 2009/48/EC should comply with the relevant essential health and safety requirements set out in Directive 2006/42/EC of the

¹ OJ L 212, 22.8.2018, p. 1.

² Directive 2009/48/EC of the European Parliament and of the Council of 18 June 2009 on the safety of toys (OJ L 170, 30.6.2009, p. 1).

European Parliament and of the Council¹ in so far as this Directive applies to them, to the extent that those health and safety requirements are not intrinsically linked to the safety of the flight by UAS. Where those health and safety requirements are intrinsically linked to the safety of the flight, only this Regulation should apply.

- (7) Directive 2014/30/EU² and Directive 2014/53/EU³ of the European Parliament and of the Council should not apply to unmanned aircraft that are subject to certification according to Regulation (EU) 2018/1139, are exclusively intended for airborne use and intended to be operated only on frequencies allocated by the Radio Regulations of the International Telecommunication Union for protected aeronautical use.
- (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 radiodetermination at frequencies below 3 000 GHz.
- (9) Directive 2014/30/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 do not fall within the scope of Directive 2014/53/EU.
- (10) Decision No 768/2008/EC of the European Parliament and of the Council⁴ 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 UAS intended to be operated in the 'open' category should be aligned with the framework established by Decision 768/2008/EC.
- (11) Directive 2001/95/EC of the European Parliament and of the Council⁵ applies to safety risks of UAS so far as there are no specific provisions with the same objective in rules of Union law governing the safety of the products concerned.
- (12) This Regulation should apply to all forms of supply, including distance selling.
- (13) Member States should take the necessary steps to ensure that UAS 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.
- (14) In order to provide citizens with high level of environmental protection, it is necessary to limit the noise emissions to the greatest possible extent. Sound power limitations applicable to UAS

¹ Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (OJ L 157, 9.6.2006, p. 24).

² Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (OJ L 96, 29.3.2014, p. 79).

³ Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC (OJ L 153, 22.5.2014, p. 62).

⁴ Decision No 768/2008/EC of the European Parliament and of the Council of 9 July 2008 on a common framework for the marketing of products, and repealing Council Decision 93/465/EEC (OJ L 218, 13.8.2008, p. 82).

⁵ Directive 2001/95/EC of the European Parliament and of the Council of 3 December 2001 on general product safety (OJ L 11, 15.1.2002, p. 4).

intended to be operated in the 'open' category might be reviewed at the end of the transitional periods as defined in Commission Implementing Regulation (EU) 2019/947¹.

- (15) Special attention should be paid to ensure compliance of products in the context of an increase of e-commerce. To that end, Member States should be encouraged to pursue cooperation with the competent authorities in third countries and to develop cooperation between market surveillance authorities and customs authorities. Market surveillance authorities should make use, when possible, of the 'notice and action' procedures and establish cooperation with their national authorities competent for the implementation of Directive 2000/31/EC of the European Parliament and of the Council². They should establish close contacts allowing rapid response with key intermediaries that provide hosting services for products sold online.
- (16) In order to ensure a high level of protection of public interest, such as health safety, and to guarantee fair competition on the Union market, economic operators should be responsible for the compliance of UAS 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.
- (17) In order to facilitate communication between economic operators, national market surveillance authorities and consumers, economic operators supplying or distributing UAS intended to be operated in the 'open' category should provide a website address in addition to the postal address.
- (18) The manufacturer, having detailed knowledge of the design and production process, is best placed to carry out the conformity assessment procedure of UAS intended to be operated in the 'open' category. Conformity assessment should therefore remain solely the obligation of the manufacturer.
- (19) This Regulation should apply to any UAS 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.
- (20) It is necessary to ensure that UAS from third countries entering the Union market comply with the requirements of this Regulation if they 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.
- (21) The distributor who makes a UAS 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.

¹ Commission Implementing Regulation (EU) 2019/947 of 24 May 2019 on the rules and procedures for the operation of unmanned aircraft (see page 45 of this Official Journal).

² Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market ('Directive on electronic commerce') (OJ L 178, 17.7.2000, p. 1).

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- (22) When placing on the market a UAS 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.
- (23) Any economic operator that either places a UAS intended to be operated in the 'open' category on the market under his own name or trademark, or modifies a UAS 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.
- (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 intended to be operated in the 'open' category.
- (25) Ensuring the traceability of a UAS 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.
- (26) This Regulation should be limited to the setting out of the essential requirements. In order to facilitate the assessment of conformity of UAS 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 Council¹ for the purpose of setting out detailed technical specifications of those requirements.
- (27) The essential requirements applicable to UAS 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.
- (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 UAS 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.
- (29) To enable economic operators to demonstrate and the competent authorities to ensure that UAS intended to be operated in the 'open' category made available on the market comply with the essential requirements, 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.

¹ Regulation (EU) No 1025/2012 of the European Parliament and of the Council of 25 October 2012 on European standardisation, amending Council Directives 89/686/EEC and 93/15/EEC and Directives 94/9/EC, 94/25/EC, 95/16/EC, 97/23/EC, 98/34/EC, 2004/22/EC, 2007/23/EC, 2009/23/EC and 2009/105/EC of the European Parliament and of the Council and repealing Council Decision 87/95/EEC and Decision No 1673/2006/EC of the European Parliament and of the Council (OJ L 316, 14.11.2012, p. 12).

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- (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 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.
- (31) To ensure effective access to information for market surveillance purposes, the information required to identify all applicable Union acts for UAS intended to be operated in the 'open' category 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.
- (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 Council¹. Rules governing the affixing of the CE marking to UAS intended to be operated in the 'open' category should be laid in this Regulation.
- (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.
- (34) It is necessary to ensure a uniformly high level of performance of bodies performing conformity assessments of UAS 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.
- (35) If a conformity assessment body demonstrates conformity of UAS 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.
- (36) In order to ensure a consistent level of conformity assessment quality, it is also necessary to set requirements for notifying authorities and other bodies involved in the assessment, notification and monitoring of notified bodies.
- (37) Regulation (EC) No 765/2008 sets out rules on the accreditation of conformity assessment bodies, provides a framework for the market surveillance of products and for controls on products from third countries, and sets out the general principles of the CE marking. The system set out in this Regulation should be complemented by the accreditation system provided for in Regulation (EC) No 765/2008.
- (38) Transparent accreditation as provided for in Regulation (EC) No 765/2008, ensuring the necessary level of confidence in certificates of conformity, should be used by national public authorities throughout the Union as the means of demonstrating the technical competence of conformity assessment bodies.
- (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 intended to be operated in the 'open' category to be placed on the Union market, it is essential that conformity assessment subcontractors and subsidiaries

¹ Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93 (OJ L 218, 13.8.2008, p. 30).

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.

- (40) It is necessary to increase the efficiency and transparency of the notification procedure and, in particular, to adapt it to new technologies so as to enable online notification.
- (41) Since notified bodies may offer their services throughout the Union, it is appropriate to give the other Member States and the Commission the opportunity to raise objections concerning a notified body. It is therefore important to provide for a period during which any doubts or concerns as to the competence of conformity assessment bodies can be clarified, before they start operating as notified bodies.
- (42) In the interests of competitiveness, it is crucial that notified bodies apply the conformity assessment procedures without creating unnecessary administrative burden for economic operators. For the same reason, and also to ensure equal treatment of economic operators, consistency in the technical application of the conformity assessment procedures needs to be ensured. This can best be achieved through appropriate coordination and cooperation between notified bodies.
- (43) Interested parties should have the right to appeal against the result of a conformity assessment carried out by a notified body. It is important to ensure that an appeal procedure against all decisions taken by notified bodies is available.
- (44) Manufacturers should take all appropriate measures to ensure that UAS 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 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.
- (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 UAS 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.
- (46) UAS whose operation present the highest risks should be subject to certification. This Regulation should therefore define the conditions under which the design, production and maintenance of UAS should be subject to certification. Those conditions are linked to a higher risk of harm to third persons in case of accidents and therefore certification should be required for UAS designed to transport people, UAS designed to transport dangerous goods and for UAS that has any dimension above 3 m and is designed to be operated over assemblies of people. Certification of UAS used in the 'specific' category of operations defined in Implementing Regulation (EU) 2019/947 should also be required if, following a risk assessment, an operational authorisation issued by the competent authority considers that the risk of the operation cannot be adequately mitigated without the certification of the UAS.
- (47) UAS placed on the market and intended to be operated in the 'open' category and bearing 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 UAS are used outside the 'open' category of operations.

- (48) UAS operators that have their principal place of business, are established, or are resident in a third country and that conduct UAS operations within the single European sky airspace should be subject to this Regulation.
- (49) The measures provided for in this Regulation are based on Opinion No 01/2018¹ issued by the European Union Aviation Safety Agency (EASA) in accordance with Article 65 of Regulation (EU) 2018/1139,

HAS ADOPTED THIS REGULATION:

CHAPTER I — GENERAL PROVISIONS

Article 1 - Subject matter

Regulation (EU) 2020/1058

- 1. This Regulation lays down the requirements for the design and manufacture of unmanned aircraft systems ('UAS') intended to be operated under the rules and conditions defined in Implementing Regulation (EU) 2019/947 and of remote identification add-ons. It also defines the type of UAS whose design, production and maintenance shall be subject to certification.
- 2. It also establishes rules on making UAS and accessories kit and remote identification add-ons available on the market and on their free movement in the Union.
- 3. This Regulation also lays down rules for third-country UAS operators, when they conduct a UAS operation pursuant to Implementing Regulation (EU) 2019/947 within the single European sky airspace.

Article 2 - Scope

Regulation (EU) 2020/1058

- 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 to operational declarations under 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 seven UAS classes referred to in Implementing Regulation (EU) 2019/947 it belongs;
 - (b) class C5 accessories kits as set out in [Part 16](#);
 - (c) 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 Implementing Regulation (EU) 2019/947 except when conducted under a declaration.
- 3. Chapter IV of this Regulation applies to UAS operators that have their principal place of business, are established, or reside in a third country, if the UAS are operated in the Union.
- 4. This Regulation does not apply to UAS intended to be exclusively operated indoors.

¹ 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>

Article 3 - Definitions

Regulation (EU) 2024/1108

For the purposes of this Regulation, the following definitions apply:

- (1) 'unmanned aircraft' ('UA') means any aircraft operating or designed to operate autonomously or to be piloted remotely without a pilot on board;
- (2) 'equipment to control unmanned aircraft remotely' means any instrument, equipment, mechanism, apparatus, appurtenance, software or accessory that is necessary for the safe operation of a UA other than a part and which is not carried on board that UA;
- (3) 'unmanned aircraft system' ('UAS') means an unmanned aircraft, as defined in Article 3 point (30) of Regulation (EU) 2018/1139¹, and its control and monitoring unit;
- (4) 'unmanned aircraft system operator' ('UAS operator') means any legal or natural person operating or intending to operate one or more UAS;
- (5) 'open' category' means a category of UAS operations that is defined in Article 4 of Implementing Regulation (EU) 2019/947;
- (6) 'specific' category means a category of UAS operations that is defined in Article 5 of Implementing Regulation (EU) 2019/947;
- (7) 'certified' category means a category of UAS operation that is defined in Article 6 of Implementing Regulation (EU) 2019/947;
- (8) 'Union harmonisation legislation' means any Union legislation harmonising the conditions for placing products on the market;
- (9) 'accreditation' means accreditation as defined in paragraph 10 of Article 2 of Regulation (EC) No 765/2008;
- (10) 'conformity assessment' means the process demonstrating whether the specified requirements relating to a product have been fulfilled;
- (11) 'conformity assessment body' means a body that performs conformity assessment activities including calibration, testing, certification and inspection;
- (12) 'CE marking' means a marking by which the manufacturer indicates that the product is in conformity with the applicable requirements set out in Union harmonisation legislation providing for its affixing;
- (13) 'manufacturer' means any natural or legal person who manufactures a product or has a product designed or manufactured, and markets that product under their name or trademark;
- (14) 'authorised representative' means any natural or legal person established within the Union who has received a written mandate from a manufacturer to act on his behalf in relation to specified tasks;
- (15) 'importer' means any natural or legal person established within the Union who places a product from a third country on the Union market;

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, ELI: <http://data.europa.eu/eli/reg/2018/1139/oj>)

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- (16) 'distributor' means any natural or legal person in the supply chain, other than the manufacturer or the importer, who makes a product available on the market;
 - (17) 'economic operators' means the manufacturer, the authorised representative of the manufacturer, the importer, and the distributor of the UAS;
 - (18) 'making available on the market' means any supply of a product for distribution, consumption or use in the Union market in the course of a commercial activity, whether in exchange of payment or free of charge;
 - (19) 'placing on the market' means the first making available of a product on the Union market;
 - (20) 'harmonised standard' means a harmonised standard as defined in point (c) of Article 2(1) of Regulation (EU) No 1025/2012;
 - (21) 'technical specification' means a document that establishes technical requirements to be fulfilled by a product, process or service;
 - (22) 'privately built UAS' means a UAS assembled or manufactured for the builder's own use, not including UAS assembled from a set of parts placed on the market by the manufacturer as a single ready-to-assemble kit;
 - (23) 'market surveillance authority' means an authority of a Member State responsible for carrying out market surveillance on its territory;
 - (24) 'recall' means any measure aimed at achieving the return of a product that has already been made available to the end-user;
 - (25) 'withdrawal' means any measure aimed at preventing a product in the supply chain from being made available on the market;
 - (26) 'single European sky airspace' means airspace above the territory to which the Treaties apply, as well as any other airspace where Member States apply Regulation (EC) No 551/2004 of the European Parliament and of the Council ¹ in accordance with paragraph 3 of Article 1 of that Regulation;
 - (27) 'remote pilot' means a natural person responsible for safely conducting the flight of a UA by operating its flight controls, either manually or, when the UA flies automatically, by monitoring its course and remaining able to intervene and change its course at any time;
 - (28) 'maximum take-off mass' ('MTOM') means the maximum UA mass, including payload and fuel, as defined by the manufacturer or the builder, at which the UA can be operated;
 - (29) 'payload' means any instrument, mechanism, equipment, part, apparatus, appurtenance, or accessory, including communications equipment, that is installed in or attached to the aircraft, and is not used or intended to be used in operating or controlling an aircraft in flight, and is not part of an airframe, engine, or propeller;
 - (30) 'follow-me mode' means a mode of operation of a UAS where the unmanned aircraft constantly follows the remote pilot within a predetermined radius;
 - (31) 'direct remote identification' means a system that ensures the local broadcast of information about a UA in operation, including the marking of the UA, so that this information can be obtained without physical access to the UA;

¹ Regulation (EC) No 551/2004 of the European Parliament and of the Council of 10 March 2004 on the organisation and use of the airspace in the single European sky (OJ L 96, 31.3.2004, p. 20).

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- (32) 'geo-awareness' means a function that, based on the data provided by Member States, detects a potential breach of airspace limitations and alerts the remote pilots so that they can take effective immediate and action to prevent that breach;
 - (33) 'sound power level L_{WA} ' means the A-weighted sound power in dB in relation to 1 pW as defined in EN ISO 3744:2010;
 - (34) 'measured sound power level' means a sound power level as determined from measurements as laid down in Part 13 of the Annex; measured values may be determined either from a single UA representative for the type of equipment or from the average of a number of UA;
 - (35) 'guaranteed sound power level' means a sound power level determined in accordance with the requirements laid down in Part 13 of the Annex which includes the uncertainties due to production variation and measurement procedures and where the manufacturer, or his authorised representative established in the Community, confirms that according to the technical instruments applied and referred to in the technical documentation it is not exceeded;
 - (36) 'hovering' means staying in the same geographical position in the air;
 - (37) 'assemblies of people' means gatherings where persons are unable to move away due to the density of the people present;
 - (38) 'control and monitoring unit' ('CMU') means the equipment to control and monitor unmanned aircraft remotely, as defined in Article 3 point (32) of Regulation (EU) 2018/1139;
 - (39) 'C2 link' means the data link between the unmanned aircraft and the CMU for the purposes of managing the flight;
 - (40) 'night' means the hours between the end of evening civil twilight and the beginning of morning civil twilight as defined in Implementing Regulation (EU) No 923/2012 ¹.

¹ Commission Implementing Regulation (EU) No 923/2012 of 26 September 2012 laying down the common rules of the air and operational provisions regarding services and procedures in air navigation and amending Implementing Regulation (EU) No 1035/2011 and Regulations (EC) No 1265/2007, (EC) No 1794/2006, (EC) No 730/2006, (EC) No 1033/2006 and (EU) No 255/2010, (OJ L 281, 13.10.2012, p.1).

CHAPTER II — UAS INTENDED TO BE OPERATED IN THE ‘OPEN’ CATEGORY OR IN THE ‘SPECIFIC’ CATEGORY UNDER OPERATIONAL DECLARATION, ACCESSORIES KITS BEARING A CLASS IDENTIFICATION LABEL AND REMOTE IDENTIFICATION ADD-ONS

SECTION 1 — PRODUCT REQUIREMENTS

Article 4 - Requirements

Regulation (EU) 2020/1058

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.

Article 5 - Making available on the market and free movement of products

Regulation (EU) 2020/1058

1. Products shall only be made available on the market if they satisfy the requirements of this Chapter and do not endanger the health or safety of persons, animals or property.
2. Member States shall not prohibit, restrict or impede, for the aspects covered by this Chapter, the making available on the market of products that comply with this Chapter.
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.

SECTION 2 — OBLIGATIONS OF ECONOMIC OPERATORS

Article 6 - Obligations of manufacturers

Regulation (EU) 2020/1058

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.
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.

3. Manufacturers shall keep the technical documentation and the EU declaration of conformity for 10 years after the product has been placed on the market.
4. Manufacturers shall ensure that procedures are in place for series production to remain in conformity with this Chapter. Changes in product design, characteristics or software, and changes in the harmonised standards or in technical specifications by reference to which conformity of a product is declared shall be adequately taken into account.

When deemed appropriate with regard to the risks presented by a product, manufacturers shall, to protect the health and safety of consumers, carry out sample testing of marketed products, investigate, and, if necessary, keep a register of complaints, of non-conforming products and product recalls and shall keep distributors informed of any such monitoring.

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 class C5 accessories kits shall ensure that the kits bears a type and a unique serial number allowing for their identification. 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 all 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](#).
6. Manufacturers shall indicate on the product their name, registered trade name or registered trademark, website address and the postal address at which they can be contacted or, where that is not possible, on its packaging, or in a document accompanying it. The address shall indicate a single point at which the manufacturer can be contacted. The contact details shall be indicated in a language easily understood by end-users and market surveillance authorities.
7. Manufacturers shall ensure that the product is accompanied by the manufacturers' instructions 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 manufacturers' instructions and information notice, as well as any labelling, shall be clear, understandable and legible.
8. Manufacturers shall ensure that each product is accompanied by a copy of the EU declaration of conformity or by a simplified EU declaration of conformity. Where a simplified EU declaration of conformity is provided, it shall contain the exact internet address where the full text of the EU declaration of conformity can be obtained.
9. Manufacturers who consider or have reason to believe that products which they have placed on the market are not in conformity with this Chapter shall immediately take the corrective measures necessary to bring that product into conformity, to withdraw it or recall it, if appropriate. Where the product presents a risk, manufacturers shall immediately inform the market surveillance authorities of the Member States in which they made the product available on the market to that effect, giving details, in particular, of the non-compliance, of any corrective measures taken and of the results thereof.
10. Manufacturers shall, further to a reasoned request from a competent national authority, provide it with all the information and documentation in paper or electronic form necessary to demonstrate the conformity of the product with this Chapter, in a language which can be easily understood by that authority. They shall cooperate with that authority, at its request, on any action taken to eliminate the risks posed by the product which they have placed on the market.

11. When placing on the market a class C5 or C6 UAS or a class C5 add-on, manufacturers shall inform the market surveillance authority of the MS of their principal place of business.

Article 7 - Authorised representatives

Regulation (EU) 2019/945

1. A manufacturer may, by a written mandate, appoint an authorised representative.
The obligations laid down in paragraph 1 of Article 6 and the obligation to draw up the technical documentation referred to in paragraph 2 of Article 6 shall not form part of the authorised representative's mandate.
2. An authorised representative shall perform the tasks specified in the mandate received from the manufacturer. The mandate shall allow the authorised representative to do at least the following:
 - (a) keep the EU declaration of conformity and the technical documentation at the disposal of national market surveillance authorities for 10 years after the product has been placed on the Union market;
 - (b) further to a reasoned request from a market surveillance or border control authority, provide that authority with all the information and documentation necessary to demonstrate the conformity of the product;
 - (c) cooperate with the market surveillance or border control authorities, at their request, on any action taken to eliminate the non-conformity of the products covered by the authorised representative's mandate or the safety risks posed by it.

Article 8 - Obligations of importers

Regulation (EU) 2020/1058

1. Importers shall only place products compliant with the requirements set out in this Chapter on the Union market.
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, they 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.

3. Importers shall indicate on the product their name, registered trade name or registered trademark, website and the postal address at which they can be contacted or, where that is not

- possible, on its packaging or in a document accompanying the product. The contact details shall be in a language easily understood by end-users and market surveillance authorities.
4. Importers shall ensure that the product is accompanied by the manufacturers' instructions 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 manufacturers' instructions and information notice, as well as any labelling, shall be clear, understandable and legible.
 5. Importers shall ensure that, while the product is under their responsibility, its storage or transport conditions do not jeopardise its compliance with the requirements set out in [Article 4](#).
 6. When deemed appropriate with regard to the risks presented by a product, importers shall, in order to protect the health and safety of end-users and third parties, carry out sample testing of products made available on the market, investigate, and, if necessary, keep a register of complaints, of non-conforming of products and product recalls, and shall keep distributors informed of any such monitoring.
 7. Importers who consider or have reason to believe that a product which they have placed on the market is not in conformity with the applicable Union harmonisation legislation shall immediately take the corrective measures necessary to bring that product into conformity, to withdraw it or recall it, if appropriate. Furthermore, where the product presents a risk, importers shall immediately inform the market surveillance authorities of the Member States in which they made the product available on the market to that effect, giving details, in particular, of the non-compliance and of any corrective measures taken.
 8. Importers shall, for 10 years after the product has been placed on the market, keep a copy of the EU declaration of conformity at the disposal of the market surveillance authorities and ensure that the technical documentation can be made available to those authorities, upon request.
 9. Importers shall, further to a reasoned request from the competent national authority, provide it with all the information and documentation in paper or electronic form necessary to demonstrate the conformity of the product in a language which can be easily understood by that authority. They shall cooperate with that authority, at its request, on any action taken to eliminate the risks posed by the product which they have placed on the market.
 10. When placing on the market a class C5 or C6 UAS or a class C5 add-on, importers shall inform the market surveillance authority of the MS of their principal place of business.

Article 9 - Obligations of distributors

Regulation (EU) 2020/1058

1. When making a product available on the Union market, distributors shall act with due care in relation to the requirements set out in this Chapter.
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 manufacturers' instructions 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. Those manufacturers' instructions 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.

3. Distributors shall ensure that, while a product is under their responsibility, its storage or transport conditions do not jeopardise its compliance with the requirements set out in [Article 4](#).
4. Distributors who consider or have reasons to believe that a product which they have made available on the market is not in conformity with the applicable Union harmonisation legislation shall make sure that the corrective measures necessary to bring that product into conformity, to withdraw it or recall it, if appropriate, are taken. Furthermore, where the product presents a risk, distributors shall immediately inform the market surveillance authorities of the Member States in which they made the product available on the market to that effect, giving details, in particular, of the non-compliance and of any corrective measures taken.
5. Distributors shall, further to a reasoned request from the competent national authority, provide it with all the information and documentation in paper or electronic form necessary to demonstrate the conformity of the product. They shall cooperate with that authority, at its request, on any action taken to eliminate the risks posed by the product which they have made available on the market.

Article 10 - Cases in which obligations of manufacturers apply to importers and distributors

Regulation (EU) 2019/945

An importer or distributor shall be considered a manufacturer for the purposes of this Chapter and shall be subject to the obligations of manufacturers pursuant to Article 6, where they place a product on the market under their name or trademark or modify the product already placed on the market in such a way that compliance with this Chapter may be affected.

Article 11 - Identification of economic operators

Regulation (EU) 2019/945

1. Economic operators shall, on request, identify the following to the market surveillance authorities:
 - (a) any economic operator who has supplied them with a product;
 - (b) any economic operator to whom they have supplied a product.
2. Economic operators shall be able to present the information referred to in paragraph 1:
 - (a) for 10 years after they have been supplied with the product;
 - (b) for 10 years after they have supplied the product.

SECTION 3 — CONFORMITY OF THE PRODUCT

Article 12 - Presumption of conformity

Regulation (EU) 2020/1058

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.

Article 13 - Conformity assessment procedures

Regulation (EU) 2020/1058

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.
2. The procedures available to conduct the conformity assessment shall be the following:
 - (a) internal production control as set out in [Part 7](#) of the Annex, when assessing the compliance of a product with the requirements set out in Parts [1](#), [5](#), [6](#), [16](#) or [17](#) of the Annex, subject to the condition that the manufacturer has applied harmonised standards, the references of which have been published in the *Official Journal of the European Union*, for all the requirements for which such standards exist;
 - (b) EU-type examination followed by conformity to type based on internal production control as set out in Part 8 of the Annex;
 - (c) conformity based on full quality assurance as set out in [Part 9](#) of the Annex, excepted when assessing the compliance of a product which is a toy within the meaning of Directive 2009/48/EC.

Article 14 - EU declaration of conformity

Regulation (EU) 2020/1058

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.
2. The EU declaration of conformity shall have the model structure set out in [Part 11](#) of the Annex, shall contain the elements set out in that Part and shall be continuously updated. It shall be translated into the language or languages required by the Member State in which market the product is placed or made available.
3. The simplified EU declaration of conformity referred to in paragraph 8 of [Article 6](#) shall contain the elements set out in [Part 12](#) of the Annex and shall be continuously updated. It shall be translated into the language or languages required by the Member State in which the product is placed or made available on the market. The full text of the EU declaration of conformity shall be available at the internet address referred to in the simplified EU declaration of conformity in a language or languages required by the Member State in which the product is placed or made available on the market.
4. Where a product is subject to more than one Union act requiring an EU declaration of conformity, a single EU declaration of conformity shall be drawn up in respect of all such Union

acts. That declaration shall contain the identification of the Union acts concerned, including their publication references.

5. By drawing up the EU declaration of conformity, the manufacturer shall assume responsibility for the compliance of the product with the requirements laid down in this Chapter.

Article 15 - General principles of the CE marking

Regulation (EU) 2019/945

The CE marking shall be subject to the general principles set out in Article 30 of Regulation (EC) No 765/2008.

Article 16 - Rules and conditions for affixing the CE marking, the identification number of the notified body, the UAS class identification label and the indication of the sound power level

Regulation (EU) 2020/1058

1. The CE marking shall be affixed visibly, legibly and indelibly to the product or to the data plate attached to it. Where that is not possible or not warranted on account of the size of the product, it shall be affixed to the packaging.
2. The UA class identification label shall be affixed visibly, legibly and indelibly to the UA or, when relevant, to each accessories of a class C5 accessories kit, 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.
3. The indication of the sound power level provided for in [Part 14](#) of the Annex shall be affixed, when applicable, visibly, legibly and indelibly on the UA, unless that is not possible or not warranted on account of the size of the product, and on the packaging.
4. The CE marking and, when applicable, the indication of the sound power level and the UA class identification label shall be affixed before the product is placed on the market.
5. The CE marking shall be followed by the identification number of the notified body where the conformity assessment procedure set out in [Part 9](#) of the Annex is applied.

The identification number of the notified body shall be affixed by the notified body itself or, under its instructions, by the manufacturer or his authorised representative.

6. Member States shall build upon existing mechanisms to ensure correct application of the regime governing the CE marking and shall take appropriate action in the event of improper use of that marking.

Article 17 - Technical documentation

Regulation (EU) 2020/1058

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.
2. The technical documentation shall be drawn up before the product is placed on the market and shall be continuously updated.
3. The technical documentation and correspondence relating to any EU-type examination procedure or the assessment of the quality system of the manufacturer shall be drawn up in an

official language of the Member State in which the notified body is established or in a language acceptable to that body.

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.

SECTION 4 — NOTIFICATION OF CONFORMITY ASSESSMENT BODIES

Article 18 - Notification

Regulation (EU) 2019/945

Member States shall notify the Commission and the other Member States of bodies authorised to carry out third-party conformity assessment tasks under this Chapter.

Article 19 - Notifying authorities

Regulation (EU) 2019/945

1. Member States shall designate a notifying authority that shall be responsible for setting up and carrying out the necessary procedures for the assessment and notification of conformity assessment bodies and the monitoring of notified bodies, including compliance with Article 24.
2. Member States may decide that the assessment and monitoring referred to in paragraph 1 shall be carried out by a national accreditation body within the meaning of Regulation (EC) No 765/2008.
3. Where the notifying authority delegates or otherwise entrusts the assessment, notification or monitoring referred to in paragraph 1 to a body which is not a governmental entity, that body shall be a legal entity and shall comply mutatis mutandis with the requirements laid down in Article 20. In addition, it shall have arrangements to cover liabilities arising out of its activities.
4. The notifying authority shall take full responsibility for the tasks performed by the body referred to in paragraph 3.

Article 20 - Requirements relating to notifying authorities

Regulation (EU) 2019/945

1. A notifying authority shall:
 - (a) be established in such a way that no conflict of interest with conformity assessment bodies occurs;
 - (b) be organised and operated so as to safeguard the objectivity and impartiality of its activities;
 - (c) be organised in such a way that each decision relating to notification of a conformity assessment body is taken by competent persons different from those who carried out the assessment;
 - (d) not offer or provide any activities that conformity assessment bodies perform or consultancy services on a commercial or competitive basis;
 - (e) shall safeguard the confidentiality of the information it obtains;

- (f) have a sufficient number of competent personnel at its disposal for the proper performance of its tasks.

Article 21 - Information obligation on notifying authorities

Regulation (EU) 2019/945

1. Member States shall inform the Commission of their procedures for the assessment and notification of conformity assessment bodies and the monitoring of notified bodies, and of any changes thereto.
2. The Commission shall make that information publicly available.

Article 22 - Requirements relating to notified bodies

Regulation (EU) 2019/945

1. For the purposes of notification, a conformity assessment body shall meet the requirements laid down in paragraphs 2 to 11.
2. A conformity assessment body shall be established under national law of a Member State and have legal personality.
3. A conformity assessment body shall be a third-party body independent of the organisation it assesses.

A body belonging to a business association or professional federation representing undertakings involved in the design, manufacturing, provision, assembly, use or maintenance of the product which it assesses may, on condition that its independence and the absence of any conflict of interest are demonstrated, be considered such a body.

4. A conformity assessment body, its top-level management and the personnel responsible for carrying out the conformity assessment tasks shall not be the designer, manufacturer, supplier, installer, purchaser, owner, user or maintainer of the product which they assess, nor the representative of any of those parties. This shall not preclude the use of the assessed product that is necessary for the operations of the conformity assessment body or the use of such product for personal purposes.

A conformity assessment body, its top-level management and the personnel responsible for carrying out the conformity assessment tasks shall not be directly involved in the design, manufacture or construction, the marketing, installation, use or maintenance of that product, or represent the parties engaged in those activities. They shall not engage in any activity that may conflict with their independence of judgement or integrity in relation to conformity assessment activities for which they are notified. This shall, in particular, apply to consultancy services.

Conformity assessment bodies shall ensure that the activities of their subsidiaries or subcontractors do not affect the confidentiality, objectivity or impartiality of their conformity assessment activities.

5. Conformity assessment bodies and their personnel shall carry out the conformity assessment activities with the highest degree of professional integrity and the requisite technical competence in the specific field and shall be free from all pressures and inducements, particularly financial, which might influence their judgement or the results of their conformity assessment activities, especially as regards persons or groups of persons with an interest in the results of those activities.

6. A conformity assessment body shall be capable of carrying out all the conformity assessment tasks assigned to it by Part 8 or 9 of the Annex in relation to which it has been notified, whether those tasks are carried out by the conformity assessment body itself or on its behalf and under its responsibility.

At all times and for each conformity assessment procedure and each kind or category of product in relation to which it has been notified, a conformity assessment body shall have at its disposal the necessary:

- (a) personnel with technical knowledge and sufficient and appropriate experience to perform the conformity assessment tasks;
- (b) descriptions of procedures in accordance with which conformity assessment is carried out, ensuring the transparency and the ability of reproduction of those procedures; it shall have appropriate policies and procedures in place that distinguish between tasks it carries out as a notified body and other activities;
- (c) procedures for the performance of activities which take due account of the size of an undertaking, the sector in which it operates, its structure, the degree of complexity of the product in question and the mass or serial nature of the production process.

A conformity assessment body shall have the means necessary to perform the technical and administrative tasks connected with the conformity assessment activities in an appropriate manner and shall have access to all necessary equipment or facilities.

7. The personnel responsible for carrying out conformity assessment tasks shall have the following:
- (a) sound technical and vocational training covering all the conformity assessment activities in relation to which the conformity assessment body has been notified;
 - (b) satisfactory knowledge of the requirements of the assessments they carry out and adequate authority to carry out those assessments;
 - (c) appropriate knowledge and understanding of the requirements, of the applicable harmonised standards and of the relevant provisions of Union harmonisation legislation;
 - (d) the ability to draw up EU-type examination certificates or quality system approvals, records and reports demonstrating that assessments have been carried out.
8. The impartiality of the conformity assessment bodies, their top-level management and of the personnel responsible for carrying out the conformity assessment tasks shall be guaranteed.
- The remuneration of the top-level management and of the personnel responsible for carrying out the conformity assessment tasks of a conformity assessment body shall not depend on the number of assessments carried out or on the results of those assessments.
9. Conformity assessment bodies shall take out liability insurance unless liability is assumed by the Member State in accordance with national law, or the Member State itself is directly responsible for the conformity assessment.
10. The personnel of a conformity assessment body shall observe professional secrecy with regard to all information obtained in carrying out their tasks under Parts 8 and 9 of the Annex or any provision of national law giving effect to them, except in relation to the competent authorities of the Member State in which its activities are carried out. Proprietary rights shall be protected.
11. Conformity assessment bodies shall participate in, or ensure that their personnel responsible for carrying out the conformity assessment tasks are informed of, the relevant standardisation

activities, the regulatory activities in the area of UAS and frequency planning, and the activities of the notified body coordination group established under the relevant Union harmonisation legislation and shall apply, as general guidance, the administrative decisions and documents produced as a result of the work of that group.

Article 23 - Presumption of conformity of notified bodies

Regulation (EU) 2019/945

Where a conformity assessment body demonstrates its conformity with the criteria laid down in the relevant harmonised standards or parts thereof, the references of which have been published in the *Official Journal of the European Union*, it shall be presumed to comply with the requirements set out in Article 22 in so far as the applicable harmonised standards cover those requirements.

Article 24 - Subsidiaries of and subcontracting by notified bodies

Regulation (EU) 2019/945

1. Where a notified body subcontracts specific tasks connected with conformity assessment or has recourse to a subsidiary, it shall ensure that the subcontractor or the subsidiary meets the requirements set out in Article 22 and shall inform the notifying authority accordingly.
2. Notified bodies shall take full responsibility for the tasks performed by subcontractors or subsidiaries, wherever these are established.
3. Activities may be subcontracted or carried out by a subsidiary only with the agreement of the client.
4. Notified bodies shall keep at the disposal of the notifying authority the relevant documents concerning the assessment of the qualifications of the subcontractor or the subsidiary and the work carried out by them under Parts 8 and 9 of the Annex.

Article 25 - Application for notification

Regulation (EU) 2019/945

1. A conformity assessment body shall submit an application for notification to the notifying authority of the Member State in which it is established.
2. The application for notification shall be accompanied by a description of the conformity assessment activities, the conformity assessment module or modules, and the product for which that body claims to be competent, as well as by an accreditation certificate issued by a national accreditation body attesting that the conformity assessment body fulfils the requirements laid down in Article 22.

Article 26 - Notification procedure

Regulation (EU) 2019/945

1. Notifying authorities may only notify conformity assessment bodies which have met the requirements laid down in Article 22.
2. They shall notify conformity assessment bodies to the Commission and the other Member States using the electronic notification tool developed and managed by the Commission.
3. The notification shall include full details of the conformity assessment activities, the conformity assessment module or modules, and the product concerned and the relevant accreditation certification.

4. The body concerned may perform the activities of a notified body only where no objections are raised by the Commission or the other Member States within 2 weeks of a notification.
5. Only such a body shall be considered a notified body for the purposes of this Chapter.
6. The notifying authority shall notify the Commission and the other Member States of any subsequent relevant changes to the notification.

Article 27 - Identification numbers and lists of notified bodies

Regulation (EU) 2019/945

1. The Commission shall assign an identification number to a notified body.
2. It shall assign a single such number even where the body is notified under several Union acts.
3. The Commission shall make publicly available the list of the bodies notified under this Regulation, including the identification numbers that have been assigned to them and the activities for which they have been notified.

The Commission shall ensure that the list is kept up to date.

Article 28 - Changes to notifications

Regulation (EU) 2019/945

1. Where a notifying authority has ascertained or has been informed that a notified body no longer meets the requirements laid down in Article 22, or that it fails to fulfil its obligations, the notifying authority shall restrict, suspend or withdraw the notification as appropriate, depending on the seriousness of the failure to meet those requirements or fulfil those obligations. It shall immediately inform the Commission and the other Member States accordingly.
2. In the event of restriction, suspension or withdrawal of the notification, or where the notified body has ceased its activity, the notifying Member State shall take appropriate steps to ensure that the files of that body are either processed by another notified body or kept available for the responsible notifying and market surveillance authorities at their request.

Article 29 - Challenge of the competence of notified bodies

Regulation (EU) 2019/945

1. The Commission shall investigate all cases where it has doubts, or doubt is brought to its attention, about the competence of a notified body or the continued fulfilment by a notified body of the requirements and responsibilities to which it is subject.
2. The notifying Member State shall provide the Commission, on request, with all the information relating to the basis for the notification or the maintenance of the competence of the notified body concerned.
3. The Commission shall ensure that all sensitive information obtained in the course of its investigations is treated confidentially.
4. Where the Commission ascertains that a notified body does not meet or no longer meets the requirements for notification, it shall inform the notifying Member State accordingly and request it to take the necessary corrective measures, including de-notification if necessary.

Article 30 - Operational obligations of notified bodies

Regulation (EU) 2020/1058

1. Notified bodies shall carry out conformity assessments in accordance with the conformity assessment procedures provided in Parts [8](#) and [9](#) of the Annex.
2. Conformity assessments shall be carried out in a proportionate manner, avoiding unnecessary burdens for economic operators. Conformity assessment bodies shall perform their activities taking due account of the size of an undertaking, the sector in which it operates, its structure, the degree of complexity of the product in question, and the mass or serial nature of the production process.

In doing so, they shall nevertheless respect the degree of rigour and the level of protection required for the compliance of the UA or UAS with this Chapter.

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.
4. Where, in the course of the monitoring of conformity following the issue of an EU-type examination certificate or a quality system approval, a notified body finds that a product no longer complies, it shall require the manufacturer to take appropriate corrective measures and shall suspend or withdraw the EU-type examination certificate or the quality system approval if necessary.
5. Where corrective measures are not taken or do not have the required effect, the notified body shall restrict, suspend or withdraw any EU-type examination certificates or quality system approvals, as appropriate.

Article 31 - Appeal against decisions of notified bodies

Regulation (EU) 2019/945

Notified bodies shall ensure that a transparent and accessible appeal procedure against their decisions is available.

Article 32 - Information obligation on notified bodies

Regulation (EU) 2019/945

1. Notified bodies shall inform the notifying authority of the following:
 - (a) any refusal, restriction, suspension or withdrawal of an EU-type examination certificate or a quality system approval in accordance with the requirements of Parts 8 and 9 of the Annex;
 - (b) any circumstances affecting the scope of, or conditions for, notification;
 - (c) any request for information which they have received from market surveillance authorities regarding conformity assessment activities;
 - (d) on request, conformity assessment activities performed within the scope of their notification and any other activity performed, including cross-border activities and subcontracting.
2. Notified bodies shall, in accordance with the requirements of Parts 8 and 9 of the Annex, provide the other bodies notified under this Chapter carrying out similar conformity assessment

activities covering the same categories of UA or UAS with the relevant information on issues relating to negative and, on request, positive conformity assessment results.

3. Notified bodies shall fulfil information obligations under Parts 8 and 9 of the Annex.

Article 33 - Exchange of experience

Regulation (EU) 2019/945

The Commission shall provide for the organisation of exchange of experience between the Member States' national authorities responsible for notification policy.

Article 34 - Coordination of notified bodies

Regulation (EU) 2019/945

1. The Commission shall ensure that appropriate coordination and cooperation between bodies notified under this Chapter are put in place and properly operated in the form of a sectorial group of notified bodies.
2. Notified bodies shall participate in the work of that group, directly or by means of designated representatives.

SECTION 5 — UNION MARKET SURVEILLANCE, CONTROL OF PRODUCTS ENTERING THE UNION MARKET AND UNION SAFEGUARD PROCEDURE

Article 35 - Market surveillance and control of products entering the Union market

Regulation (EU) 2019/945

1. Member States shall organise and perform surveillance of the products that are placed on the Union market in accordance with paragraph 3 of Article 15 and Articles 16 to 26 of Regulation (EC) No 765/2008.
2. Member States shall organise and perform control of the products that enter the Union market in accordance with paragraph 5 of Article 15 and Articles 27, 28 and 29 of Regulation (EC) No 765/2008.
3. Member States shall ensure that their market surveillance and border control authorities cooperate with the competent authorities designated under Article 17 of Implementing Regulation (EU) 2019/947 on safety matters and shall establish appropriate communication and coordination mechanisms between them, making the best use of the information contained in the occurrence reporting system defined in Regulation (EU) No 376/2014 of the European Parliament and of the Council¹ and the information systems defined in Articles 22 and 23 of Regulation (EC) No 765/2008.

¹ Regulation (EU) No 376/2014 of the European Parliament and of the Council of 3 April 2014 on the reporting, analysis and follow-up of occurrences in civil aviation, amending Regulation (EU) No 996/2010 of the European Parliament and of the Council and repealing Directive 2003/42/EC of the European Parliament and of the Council and Commission Regulations (EC) No 1321/2007 and (EC) No 1330/2007 (OJ L 122, 24.4.2014, p. 18).

Article 36 - Procedure for dealing with products presenting a risk at national level

Regulation (EU) 2020/1058

1. Where the market surveillance authorities of one Member State 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.

2. Where the market surveillance authorities consider that non-compliance is not restricted to their national territory, they shall inform the Commission and the other Member States of the results of the evaluation and of the actions which they have required the economic operator to take.
3. The economic operator shall ensure that all appropriate corrective action is taken in respect of all products concerned that it has made available on the market throughout the Union.
4. Where the relevant economic operator does not take adequate corrective action within the period referred to in the second subparagraph of paragraph 1, the market surveillance authorities shall take all appropriate provisional measures to prohibit or restrict the product being made available on their national market, to withdraw the product from that market or to recall it.

The market surveillance authorities shall inform the Commission and the other Member States, without delay, of those measures.

5. The information referred to in paragraph 4 shall include all available details, in particular the data necessary for the identification of the non-compliant product, the origin of the product, the nature of the non-compliance alleged and the risk involved, the nature and duration of the national measures taken and the arguments put forward by the relevant economic operator. In particular, the market surveillance authorities shall indicate whether the non-compliance is due to either of the following:
 - (a) failure of the product to meet the requirements set out in [Article 4](#);
 - (b) shortcomings in the harmonised standards referred to in [Article 12](#).
6. Member States other than the Member State initiating the procedure under this Article shall, without delay, inform the Commission and the other Member States of any measures adopted and of any additional information at their disposal relating to the non-compliance of the product concerned, and, in the event of disagreement with the adopted national measure, of their objections.

7. Where, within three months of receipt of the information referred to in paragraph 5, no objection has been raised by either a Member State or the Commission in respect of a provisional measure taken by a Member State, that measure shall be deemed justified.
8. Member States shall ensure that appropriate restrictive measures, such as withdrawal of the product from the market, are taken in respect of the product concerned without delay.

Article 37 - Union safeguard procedure

Regulation (EU) 2019/945

1. Where, on completion of the procedure set out in paragraphs 3 and 4 of Article 36, objections are raised against a measure taken by a Member State, or where the Commission considers a national measure to be contrary to Union legislation, the Commission shall, without delay, enter into consultation with the Member States and the relevant economic operator or operators and shall evaluate the national measure. On the basis of the results of that evaluation, the Commission shall decide whether the national measure is justified or not.

The Commission shall address its decision to all Member States and shall immediately communicate it to them and the relevant economic operator or operators.

2. If the national measure is considered justified, all Member States shall take the necessary measures to ensure that the non-compliant product is withdrawn or recalled from their market, and shall inform the Commission accordingly. If the national measure is considered unjustified, the Member State concerned shall withdraw that measure.
3. Where the national measure is considered justified and the non-compliance of the product is attributed to shortcomings in the harmonised standards referred to in point (b) of paragraph 5 of Article 36 of this Regulation, the Commission shall apply the procedure provided for in Article 11 of Regulation (EU) No 1025/2012.

Article 38 - Compliant product which presents a risk

Regulation (EU) 2019/945

1. Where, having carried out an evaluation under paragraph 1 of Article 36, a Member State finds that, although the product is in compliance with this Chapter, it presents a risk to the health or safety of persons or to other aspects of public interest protection covered by this Chapter, it shall require the relevant economic operator to take all appropriate measures to ensure that the product concerned, when placed on the market, no longer presents that risk, to withdraw the product from the market or to recall it within a reasonable period, commensurate with the nature of the risk, as it may prescribe.
2. The economic operator shall ensure that corrective action is taken in respect of all the products concerned that he has made available on the market throughout the Union.
3. The Member State shall immediately inform the Commission and the other Member States. That information shall include all available details, in particular the data necessary for the identification of the product concerned, the origin and the supply chain of product, the nature of the risk involved and the nature and duration of the national measures taken.
4. The Commission shall, without delay, enter into consultation with the Member States and the relevant economic operator or operators and shall evaluate the national measures taken. On the basis of the results of that evaluation, the Commission shall decide whether the national measure is justified or not and, where necessary, propose appropriate measures.

5. The Commission shall address its decision to all Member States and shall immediately communicate it to them and the relevant economic operator or operators.

Article 39 - Formal non-compliance

Regulation (EU) 2019/945

1. Without prejudice to Article 36, where a Member State makes one of the following findings concerning products covered by this Chapter, it shall require the relevant economic operator to put an end to the non-compliance concerned:
 - (a) the CE marking has been affixed in violation of Article 30 of Regulation (EC) No 765/2008 or of Article 15 or Article 16 of this Regulation;
 - (b) the CE marking or type has not been affixed;
 - (c) the identification number of the notified body, where the conformity assessment procedure set out in Part 9 of the Annex is applied, has been affixed in violation of Article 16 or has not been affixed;
 - (d) the UA class identification label has not been affixed;
 - (e) the indication of the sound power level if required has not been affixed;
 - (f) the serial number has not been affixed or has not the correct format;
 - (g) the manual or the information notice is not available;
 - (h) the EU declaration of conformity is missing or has not been drawn up;
 - (i) the EU declaration of conformity has not been drawn up correctly;
 - (j) technical documentation is either not available or not complete;
 - (k) manufacturer's or importer's name, registered trade name or registered trademark, website address or postal address are missing.
2. Where the non-compliance referred to in paragraph 1 persists, the Member State concerned shall take all appropriate measures to restrict or prohibit the product being made available on the market or ensure that it is withdrawn or recalled from the market.

CHAPTER III — REQUIREMENTS FOR UAS OPERATED IN THE 'CERTIFIED' THE 'SPECIFIC' CATEGORIES EXCEPT WHEN CONDUCTED UNDER A DECLARATION

Article 40 - Requirements for UAS operated in the 'certified' and 'specific' categories except when conducted under a declaration

Regulation (EU) 2024/1108

1. The design, production and maintenance of UAS that meets any of the following conditions shall be certified:
 - (a) it has a characteristic dimension of 3 m or more, and is designed to be operated over assemblies of people unless the UA is lighter than air;
 - (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 intended to be used in the 'specific' category of operations defined in [Article 5](#) of Implementing Regulation (EU) 2019/947 and the competent authority has concluded, in accordance with [Article 12\(1\)](#) of Regulation (EU) 2019/947, on the basis of the risk assessment conducted by UAS operator in accordance with [Article 11](#) of that Regulation, that the risk of the operation cannot be adequately mitigated without the certification of the UAS.
- 1a. Paragraph 1 does not apply to UAS that are specifically designed or modified for research, experimental or scientific purposes, and are likely to be produced in very limited numbers. The operation of such UAS will be subject to a permit to fly in accordance with Subpart B of Annex I of Regulation (EU) No 748/2012.
2. An UAS that meets the conditions specified in paragraph 1 shall comply with the applicable requirements laid down in Commission Regulation (EU) No 748/2012¹, Commission Regulation (EU) 2015/640² and Commission Delegated Regulation (EU) 2024/1107³.
- 2a. UAS certified for reasons other than those specified in paragraph 1 shall comply with the applicable requirements laid down in Regulation (EU) No 748/2012 and in Regulation (EU) 2015/640.
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 as defined by the Light UAS Operator Certificate (LUC) pursuant to Part C of the Annex to Implementing Regulation (EU) 2019/947.

¹ Commission Regulation (EU) No 748/2012 of 3 August 2012 laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organisations (OJ L 224, 21.8.2012, p. 1).

² Commission Regulation (EU) 2015/640 of 23 April 2015 on additional airworthiness specifications for a given type of operations and amending Regulation (EU) No 965/2012 (OJ L 106, 24.4.2015, p. 18).

³ Commission Delegated Regulation (EU) 2024/1107 of 13 March 2024 supplementing Regulation (EU) No 2018/1139 of the European Parliament and of the Council by laying down detailed rules for the continuing airworthiness of certified unmanned aircraft systems and their components, and on the approval of organisations and personnel involved in these tasks (OJ L, 2024/1107, 17.5.2024, ELI: http://data.europa.eu/eli/reg_del/2024/1107/oj).

4. Unless privately built, all UAS not subject to registration according to [Article 14](#) of the Implementing Regulation (EU) 2019/947 shall have a unique serial number compliant with standard ANSI/CTA-2063-A-2019, Small Unmanned Aerial Systems Serial Numbers, 2019.
5. Each UA intended to be operated in the 'specific' category and at a height below 120 meters shall be equipped with a remote identification system that allows:
 - (a) the upload of the UAS operator registration number required in accordance with [Article 14](#) of Implementing Regulation (EU) 2019/947 and any additional number provided by the registration system. The system shall perform a consistency check verifying the integrity of the full string provided to the UAS operator at the time of registration. In case of inconsistency, the UAS shall emit an error message to the UAS operator;
 - (b) the periodic transmission of at least the following data, in real time during the whole duration of the flight, in a way that it can be received by existing mobile devices:
 - (i) the UAS operator registration number and the verification code provided by the Member State during the registration process unless the consistency check defined in point(a) is not passed;
 - (ii) the unique serial number of the UA compliant with paragraph 4 or, if the UA is privately built, the unique serial number of the add on, as specified in [Part 6](#) of the Annex;
 - (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;
 - (v) the geographical position of the remote pilot;
 - (vi) an indication of the emergency status of the UAS.
 - (c) to reduce the ability of tampering the functionality of the direct remote identification system.

CHAPTER IV — THIRD-COUNTRY UAS OPERATORS

Article 41 - Third-country UAS operators

Regulation (EU) 2019/945

1. UAS operators that have their principal place of business, are established, or reside in a third country, shall comply with Implementing Regulation (EU) 2019/947 for the purpose of UAS operations within the single European sky airspace.
2. The competent authority for the third-country UAS operator shall be the competent authority of the first Member State where the UAS operator intends to operate.
3. By way of derogation from paragraph 1, a certificate of the remote pilot competency or UAS operator in accordance with Implementing Regulation (EU) 2019/947, or an equivalent document, may be recognised by the competent authority for the purpose of operation within, to, and out of the Union provided that:
 - (a) the third country asked for such recognition;
 - (b) the certificate of the remote pilot competency or the UAS operator's certificate are valid documents of the State of issue; and

-
- (c) the Commission, after consultation of EASA, has ensured that the requirements on the basis of which such certificates have been issued provide the same level of safety as this Regulation does.

CHAPTER V — FINAL PROVISIONS

Article 42 - Entry into force

Regulation (EU) 2019/945

This Regulation shall enter into force on the twentieth 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, 12 March 2019.

For the Commission

The President

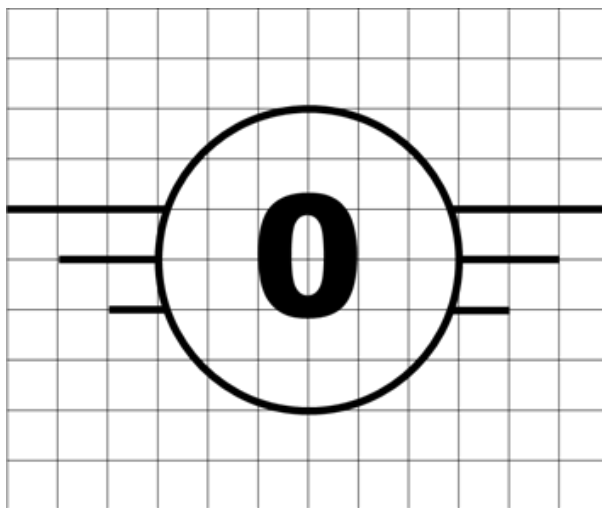
Jean-Claude JUNCKER

ANNEX TO DELEGATED REGULATION (EU) 2019/945

PART 1 — Requirements for a class C0 Unmanned aircraft system

Regulation (EU) 2020/1058

A class C0 UAS bears the following class identification label on the UA:



A class C0 UAS shall comply with the following:

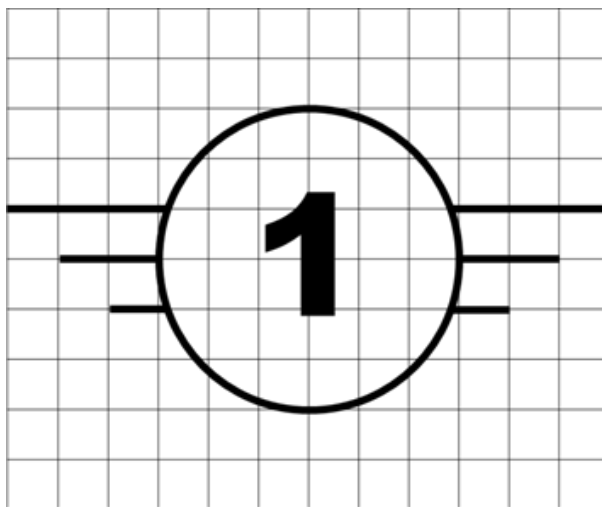
- (1) have an MTOM of less than 250 g, including payload;
- (2) have a maximum speed in level flight of 19 m/s;
- (3) have a maximum attainable height above the take-off point limited to 120 m;
- (4) be safely controllable with regards to stability, manoeuvrability and the command and control link performance, 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;
- (5) be designed and constructed in such a way as to minimise injury to people during operation, sharp edges shall be avoided, unless technically unavoidable under good design and manufacturing practice. If equipped with propellers, the UA shall be designed in such a way as to limit any injury that may be inflicted by the propeller blades;
- (6) be exclusively powered by electricity;
- (7) if equipped with a follow-me mode and when this function is on, be in a range not exceeding 50 m from the remote pilot, and make it possible for the remote pilot to regain control of the UA;
- (8) be placed on the market with manufacturer's instructions providing:
 - (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; and
 - a description of the behaviour of the UA in case of a loss of the command and control link;
- (b) clear operational instructions;
- (c) operational limitations (including but not limited to meteorological conditions and day/night operations); and
- (d) appropriate description of all the risks related to UAS operations adapted for the age of the user;
- (9) include an information notice published by the European Union Aviation Safety Agency (EASA) providing the applicable limitations and obligations, in accordance with Implementing Regulation (EU) 2019/947;
- (10) Points (4), (5) and (6) do not apply to UAS that are toys in the meaning of Directive 2009/48/EC on the safety of toys.

PART 2 — Requirements for a class C1 Unmanned aircraft system

Regulation (EU) 2024/1108

A class C1 UAS bears the following class identification label on the UA:



A class C1 UAS shall comply with the following:

- (1) be made of materials and have performance and physical characteristics such as to ensure that in the event of an impact at terminal velocity with a human head, the energy transmitted to the human head is less than 80 J, or, as an alternative, shall have an MTOM of less than 900 g, including payload;
- (2) have a maximum speed in level flight of 19 m/s;
- (3) have a maximum attainable height above the take-off point limited to 120 m or be equipped with a system that limits the height above the surface or above the take-off point to 120 m or to a value selectable by the remote pilot; if the value is selectable, clear information about the

- height of the UA above the surface or take-off point during flight shall be provided to the remote pilot;
- (4) be safely controllable with regards to stability, manoeuvrability and 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;
 - (5) have the requisite mechanical strength for the UA, including any necessary safety factor, and, where appropriate, stability to withstand any stress to which it is subjected to during use without any breakage or deformation that might interfere with its safe flight;
 - (6) be designed and constructed in such a way as to minimise injury to people during operation, sharp edges of the UA shall be avoided, unless technically unavoidable under good design and manufacturing practice; if equipped with propellers, the UA shall be designed in such a way as to limit any injury that may be inflicted by the propeller blades;
 - (7) in case of a loss of the command and control link, have a reliable and predictable method for the UA to recover the command and control link or if this fails, terminate the flight in a way that reduces the effect on third parties in the air or on the ground;
 - (8) unless it is a fixed-wing UA, have a guaranteed A-weighted sound power level L_{WA} determined as per [Part 13](#) not exceeding the levels established in [Part 15](#);
 - (9) unless it is a fixed-wing UA, have the indication of the guaranteed A-weighted sound power level affixed on the UA and/or its packaging as per [Part 14](#);
 - (10) be exclusively powered by electricity;
 - (11) have a unique serial number compliant with standard ANSI/CTA-2063-A-2019, Small Unmanned Aerial Systems Serial Numbers, 2019;
 - (12) have a direct remote identification that:
 - (a) allows the upload of the UAS operator registration number required in accordance with [Article 14](#) of Implementing Regulation (EU) 2019/947 and any additional number provided by the registration system; the system shall perform a consistency check verifying the integrity of the full string provided to the UAS operator at the time of registration; in case of inconsistency, the UAS shall emit an error message to the UAS operator;
 - (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, in a way that it can be received directly by existing mobile devices within the broadcasting range, of at least the following data:
 - (i) the UAS operator registration number and the verification code provided by the Member State of registration during the registration process unless the consistency check defined in point (a) is not passed;
 - (ii) the unique physical serial number of the UA compliant with point (11);
 - (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;

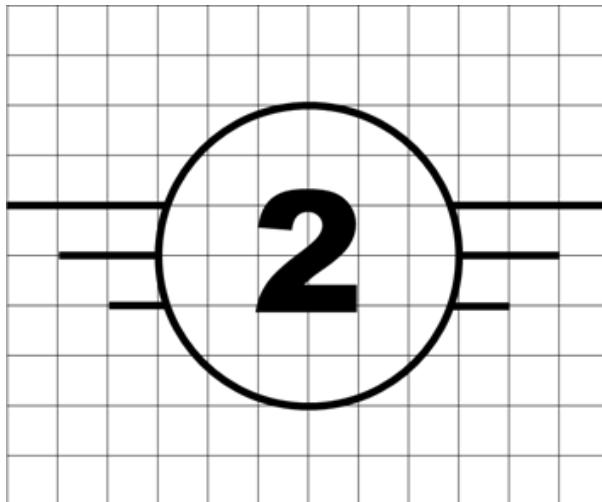
- (v) the geographical position of the remote pilot or, if not available, the take-off point; and
 - (vi) an indication of the emergency status of the UAS;
- (c) reduces the ability of tampering the functionality of the direct remote identification system;
- (13) be equipped with a geo-awareness function that provides:
 - (a) an interface to load and update data containing information on airspace limitations related to UA position and height imposed by the UAS geographical zones, as defined by [Article 15](#) of Implementing Regulation (EU) 2019/947, which ensures that the process of loading or updating such data does not degrade its integrity and validity;
 - (b) a warning alert to the remote pilot when a potential breach of airspace limitations is detected; and
 - (c) information to the remote pilot on the UA's status as well as a warning alert when its positioning or navigation systems cannot ensure the proper functioning of the geo-awareness function;
- (14) if the UA has a function that limits its access to certain airspace areas or volumes, this function shall operate in such a manner that it interacts smoothly with the flight control system of the UA without adversely affecting flight safety; in addition, clear information shall be provided to the remote pilot when this function prevents the UA from entering these airspace areas or volume;
- (15) provide the remote pilot with a clear warning when the battery of the UA or its CMU reaches a low level to allow the remote pilot sufficient time to safely land the UA;
- (16) be equipped:
 - (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 allow a person on the ground to distinguish the UA from a manned aircraft;
- (17) if equipped with a follow-me mode and when this function is on, be in a range not exceeding 50 m from the remote pilot, and make it possible for the remote pilot to regain control of the UA;
- (18) be placed on the market with manufacturer's instructions providing:
 - (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;
 - the procedures to upload the UAS operator registration number into the remote identification system;
 - reference of the transmission protocol used for the direct remote identification system emission;

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- sound power level; and
 - a description of the behaviour of the UA in case of a loss of data link; and the method to recover the command and control link of the UA.
- (b) clear operational instructions;
 - (c) procedure to upload the airspace limitations into the geo-awareness function;
 - (d) maintenance instructions;
 - (e) troubleshooting procedures;
 - (f) operational limitations (including but not limited to meteorological conditions and day/night operations); and
 - (g) appropriate description of all the risks related to UAS operations;
- (19) include an information notice published by EASA providing the applicable limitations and obligations, in accordance with Implementing Regulation (EU) 2019/947;
- (20) if equipped with a network remote identification system it shall:
- (a) allow, in real time during the whole duration of the flight, the transmission from the UA using an open and documented transmission protocol, in a way that it can be received through a network, of at least the following data;
 - (i) the UAS operator registration number and the verification code provided by the Member State of registration during the registration process unless the consistency check defined in point (a) is not passed;
 - (ii) the unique serial number of the UA compliant with point (11);
 - (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;
 - (v) the geographical position of the remote pilot or, if not available, the take-off point; and
 - (vi) an indication of the emergency status of the UAS;
 - (b) reduce the ability of tampering the functionality of the direct remote identification system.

PART 3 — Requirements for a class C2 Unmanned aircraft system

Regulation (EU) 2024/1108

A class C2 UAS bears the following class identification label on the UA:



A class C2 UAS shall comply with the following:

- (1) have an MTOM of less than 4 kg, including payload;
- (2) have a maximum attainable height above the take-off point limited to 120 m or be equipped with a system that limits the height above the surface or above the take-off point to 120 m or to a value selectable by the remote pilot. If the value is selectable, clear information about the height of the UA above the surface or take-off point during flight shall be provided to the remote pilot;
- (3) be safely controllable with regard to stability, manoeuvrability and 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;
- (4) have the requisite mechanical strength for the UA, including any necessary safety factor, and, where appropriate, stability to withstand any stress to which it is subjected to during use without any breakage or deformation that might interfere with its safe flight;
- (5) in the case of a tethered UA, have a tensile length of the tether that is less than 50 m and a mechanical strength that is no less than:
 - (a) for heavier-than-air aircraft, 10 times the weight of the aerodyne at maximum mass;
 - (b) for lighter-than-air aircraft, 4 times the force exerted by the combination of the maximum static thrust and the aerodynamic force of the maximum allowed wind speed in flight;
- (6) be designed and constructed in such a way as to minimise injury to people during operation, sharp edges of the UA shall be avoided, unless technically unavoidable under good design and manufacturing practice; if equipped with propellers, the UA shall be designed in such a way as to limit any injury that may be inflicted by the propeller blades;
- (7) unless tethered, in case of a loss of the command and control link, have a reliable and predictable method for the UA to recover the command and control link or, if it fails, terminate the flight in a way that reduces the effect on third parties in the air or on the ground;

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- (8) unless tethered, be equipped with a command and control link protected against unauthorised access to the command and control functions;
 - (9) unless it is a fixed-wing UA, be equipped with a low-speed mode selectable by the remote pilot and limiting the ground speed to no more than 3 m/s.
 - (10) unless it is a fixed-wing UA, have a guaranteed A-weighted sound power level L_{WA} determined as per [Part 13](#) not exceeding the levels established in [Part 15](#);
 - (11) unless it is a fixed-wing UA, have the indication of the guaranteed A-weighted sound power level affixed on the UA and/or its packaging as per [Part 14](#);
 - (12) be exclusively powered by electricity;
 - (13) have a unique serial number compliant with standard ANSI/CTA-2063-A-2019, Small Unmanned Aerial Systems Serial Numbers, 2019;
 - (14) have a direct remote identification that:
 - (a) allows the upload of the UAS operator registration number required in accordance with [Article 14](#) of Implementing Regulation (EU) 2019/947 and any additional number provided by the registration system. The system shall perform a consistency check verifying the integrity of the full string provided to the UAS operator at the time of registration. In case of inconsistency, the UAS shall emit an error message to the UAS operator;
 - (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, in a way that it can be received directly by existing mobile devices within the broadcasting range, of at least the following data:
 - (i) the UAS operator registration number and the verification code provided by the Member State during the registration process, unless the consistency check defined in point (a) is not passed;
 - (ii) the unique serial number of the UA compliant with point (13);
 - (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;
 - (v) the geographical position of the remote pilot or, if not available, the take-off point; and
 - (vi) an indication of the emergency status of the UAS;
 - (c) reduces the ability of tampering the functionality of the direct remote identification system.
 - (15) be equipped with a geo-awareness function that provides:
 - (a) an interface to load and update data containing information on airspace limitations related to UA position and height imposed by the UAS geographical zones, as defined by [Article 15](#) of Implementing Regulation (EU) 2019/947, which ensures that the process of loading or updating of this data does not degrade its integrity and validity;
 - (b) a warning alert to the remote pilot when a potential breach of airspace limitations is detected; and

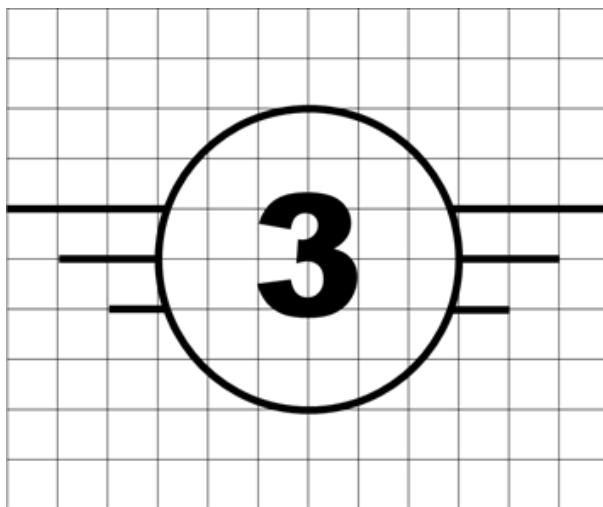
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- (c) information to the remote pilot on the UA's status as well as a warning alert when its positioning or navigation systems cannot ensure the proper functioning of the geo-awareness function;
 - (16) if the UA has a function that limits its access to certain airspace areas or volumes, this function shall operate in such a manner that it interacts smoothly with the flight control system of the UA without adversely affecting flight safety; in addition, clear information shall be provided to the remote pilot when this function prevents the UA from entering these airspace areas or volumes;
 - (17) provide the remote pilot with a clear warning when the battery of the UA or its CMU reaches a low level to allow the remote pilot sufficient time to safely land the UA;
 - (18) be equipped:
 - (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 allow a person on the ground, to distinguish the UA from a manned aircraft;
 - (19) be placed on the market with manufacturer's instructions providing:
 - (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;
 - the procedures to upload the UAS operator registration number into the remote identification system;
 - reference of the transmission protocol used for the direct remote identification system emission;
 - sound power level; and
 - description of the behaviour of the UA in case of a loss of the command and control link, and the method to recover the command and control link of the UA; and
 - (b) clear operational instructions;
 - (c) the procedure to upload the airspace limitations into the geo-awareness function;
 - (d) maintenance instructions;
 - (e) troubleshooting procedures;
 - (f) operational limitations (including but not limited to meteorological conditions and day/night operations); and
 - (g) appropriate description of all the risks related to UAS operations;
 - (20) include an information notice published by EASA providing the applicable limitations and obligations, in accordance with Implementing Regulation (EU) 2019/947;
 - (21) if equipped with a network remote identification system it shall:

- (a) ensure, in real time during the whole duration of the flight, the transmission from the UA using an open and documented transmission protocol, in a way that it can be received through a network, of at least the following data:
 - (i) the UAS operator registration number and the verification code provided by the Member State of registration during the registration process unless the consistency check defined in point 14(a) is not passed;
 - (ii) the unique serial number of the UA compliant with point (13);
 - (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;
 - (v) the geographical position of the remote pilot or, if not available, the take-off point; and
 - (vi) an indication of the emergency status of the UAS;
- (b) reduce the ability of tampering the functionality of the direct remote identification system.

PART 4 — Requirements for a class C3 Unmanned aircraft system

Regulation (EU) 2024/1108

A class C3 UAS bears the following class identification label on the UA:



A class C3 UAS shall comply with the following:

- (1) have an MTOM of less than 25 kg, including payload, and have a maximum characteristic dimension of less than 3 m;
- (2) have a maximum attainable height above the take-off point limited to 120 m or be equipped with a system that limits the height above the surface or above the take-off point to 120 m or to a value selectable by the remote pilot. If the value is selectable, clear information about the height of the UA above the surface or take-off point during flight shall be provided to the remote pilot;
- (3) be safely controllable with regard to stability, manoeuvrability and 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;
- (4) in the case of a tethered UA, have a tensile length of the tether that is less than 50 m and a mechanical strength of no less than:
 - (a) for heavier-than-air aircraft, 10 times the weight of the aerodyne at maximum mass;
 - (b) for lighter-than-air aircraft, 4 times the force exerted by the combination of the maximum static thrust and the aerodynamic force of the maximum allowed wind speed in flight;
 - (5) unless tethered, in case of a loss of the command and control link, have a reliable and predictable method for the UA to recover the command and control link or, if it fails, terminate the flight in a way that reduces the effect on third parties in the air or on the ground;
 - (6) unless it is a fixed-wing UA, have the indication of the guaranteed A-weighted sound power level L_{WA} determined as per [Part 13](#) affixed on the UA and/or its packaging as per [Part 14](#);
 - (7) be exclusively powered by electricity;
 - (8) have a unique serial number compliant with standard ANSI/CTA-2063-A-2019, Small Unmanned Aerial Systems Serial Numbers, 2019;
 - (9) unless tethered, have a direct remote identification that:
 - (a) allows the upload of the UAS operator registration number required in accordance with [Article 14](#) of Implementing Regulation (EU) 2019/947 and any additional number provided by the registration system; the system shall perform a consistency check verifying the integrity of the full string provided to the UAS operator at the time of registration; in case of inconsistency, the UAS shall emit an error message to the UAS operator;
 - (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, in a way that it can be received directly by existing mobile devices within the broadcasting range, of at least the following data:
 - (i) the UAS operator registration number and the verification code provided by the Member State during the registration process unless the consistency check defined in point (a) is not passed;
 - (ii) the unique serial number of the UA compliant with point (8);
 - (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;
 - (v) the geographical position of the remote pilot or, if not available, the take-off point; and
 - (vi) an indication of the emergency status of the UAS;
 - (c) reduces the ability of tampering the functionality of the direct remote identification system;
 - (10) be equipped with a geo-awareness function that provides:

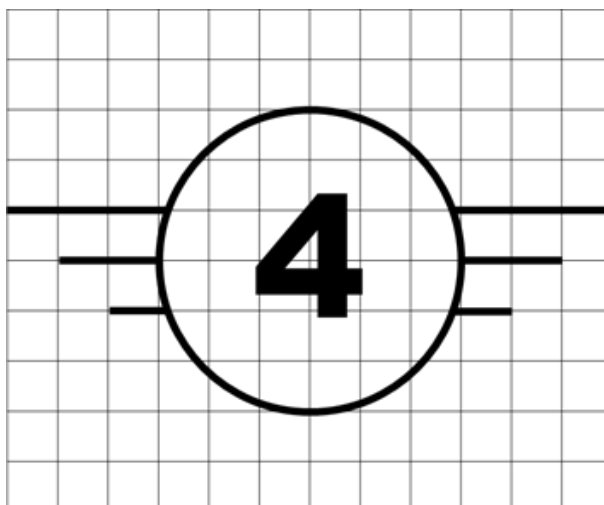
- (a) an interface to load and update data containing information on airspace limitations related to UA position and height imposed by the UAS geographical zones, as defined by [Article 15](#) of Implementing Regulation (EU) 2019/947, which ensures that the process of loading or updating of this data does not degrade its integrity and validity;
 - (b) a warning alert to the remote pilot when a potential breach of airspace limitations is detected; and
 - (c) information to the remote pilot on the UA's status as well as a warning alert when its positioning or navigation systems cannot ensure the proper functioning of the geo-awareness function;
- (11) if the UA has a function that limits its access to certain airspace areas or volumes, this function shall operate in such a manner that it interacts smoothly with the flight control system of the UA without adversely affecting flight safety; in addition, clear information shall be provided to the remote pilot when this function prevents the UA from entering these airspace areas or volumes;
- (12) unless tethered, be equipped with a command and control link protected against unauthorised access to the command and control functions;
- (13) provide the remote pilot with a clear warning when the battery of the UA or its CMU reaches a low level to allow the remote pilot sufficient time to safely land the UA;
- (14) be equipped:
 - (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 allow a person on the ground to distinguish the UA from a manned aircraft;
- (15) be placed on the market with manufacturer's instructions providing:
 - (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;
 - the procedures to upload the UAS operator registration number into the remote identification system;
 - reference of the transmission protocol used for the direct remote identification system emission;
 - sound power level;
 - description of the behaviour of the UA in case of a loss of the command and control link, and the method to recover command and control link of the UA.
 - (b) clear operational instructions;
 - (c) the procedure to upload the airspace limitations into the geo-awareness function;
 - (d) maintenance instructions;

- (e) troubleshooting procedures;
 - (f) operational limitations (including but not limited to meteorological conditions and day/night operations); and
 - (g) appropriate description of all the risks related to UAS operations;
- (16) include an information notice published by EASA providing the applicable limitations and obligations, in accordance with Implementing Regulation (EU) 2019/947;
- (17) if equipped with a network remote identification system it shall:
- (a) ensure, in real time during the whole duration of the flight, the transmission from the UA using an open and documented transmission protocol, in a way that it can be received through a network, of at least the following data:
 - (i) the UAS operator registration number and the verification code provided by the Member State of registration during the registration process unless the consistency check defined in point 9(a) is not passed;
 - (ii) the unique serial number of the UA compliant with point (8);
 - (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;
 - (v) the geographical position of the remote pilot or, if not available, the take-off point; and
 - (vi) an indication of the emergency status of the UAS;
 - (b) reduce the ability of tampering the functionality of the direct remote identification system.

PART 5 — Requirements for a class C4 Unmanned aircraft system

Regulation (EU) 2020/1058

A class C4 UAS bears the following label on the UA in a visible manner:



A class C4 UAS shall comply with the following:

- (1) have an MTOM of less than 25 kg, including payload;
- (2) be safely controllable and manoeuvrable 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;
- (3) not be capable of automatic control modes except for flight stabilisation assistance with no direct effect on the trajectory and lost link assistance provided that a pre-determined fixed position of the flight controls in case of lost link is available;
- (4) be placed on the market with manufacturer's instructions providing:
 - (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; and
 - a description of the behaviour of the UA in case of a loss of the command and control link;
 - (b) clear operational instructions;
 - (c) maintenance instructions;
 - (d) troubleshooting procedures;
 - (e) operational limitations (including but not limited to meteorological conditions and day/night operations); and
 - (f) appropriate description of all the risks related to UAS operations;
- (5) include an information notice published by EASA providing the applicable limitations and obligations, in accordance with Implementing Regulation (EU) 2019/947.

PART 6 — Requirements for a direct remote identification add-on

Regulation (EU) 2020/1058

A direct remote identification add-on shall comply with the following:

- (1) allow the upload of the UAS operator registration number required in accordance with [Article 14](#) of Implementing Regulation (EU) 2019/947 and any additional number provided by the registration system; the system shall perform a consistency check verifying the integrity of the full string provided to the UAS operator at the time of registration; in case of inconsistency, the system shall emit an error message to the UAS operator;
- (2) have a unique serial number compliant with standard ANSI/CTA-2063-A-2019, Small Unmanned Aerial Systems Serial Numbers, 2019, affixed to the add-on and its packaging or its manufacturer's instructions in a legible manner;
- (3) ensure, in real time during the whole duration of the flight, the direct periodic broadcast from the UA using an open and documented transmission protocol, in a way that it can be received directly by existing mobile devices within the broadcasting range, of at least the following data:

- (i) the UAS operator registration number and the verification code provided by the Member State of registration during the registration process unless the consistency check defined in point (a) is not passed;
 - (ii) the unique serial number of the add-on compliant with point (2);
 - (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;
- (4) reduce the ability of tampering the functionality of the direct remote identification system; and
- (5) be placed on the market with manufacturer's instructions providing the reference of the transmission protocol used for the direct remote identification emission and the instruction to:
- (a) install the module on the UA; and
 - (b) upload the UAS operator registration number.

PART 7 — Conformity assessment Module A — Internal production control

Regulation (EU) 2020/1058

1. Internal production control is the conformity assessment procedure whereby the manufacturer fulfils the obligations set out in points 2, 3 and 4 of this Part, and ensures and declares on their sole responsibility that the products concerned satisfy the requirements set out in Parts [1](#), [5](#), [6](#), [16](#) or [17](#) which apply to them.
2. **Technical documentation**
The manufacturer shall develop the technical documentation in accordance with [Article 17](#) of this Regulation.
3. **Manufacturing**
The manufacturer shall take all measures necessary so that the manufacturing process and its monitoring ensure compliance of the manufactured product with the technical documentation referred to in point 2 of this Part and with the requirements set out in Parts [1](#), [5](#), [6](#), [16](#) or [17](#) which apply to them.
4. **CE marking and EU declaration of conformity**
 - (1) In accordance with Articles [15](#) and [16](#) of this Regulation, the manufacturer shall affix the CE marking and, when applicable, the UA class identification label, to each individual product that satisfies the applicable requirements set out in Parts [1](#), [5](#), [6](#), [16](#) or [17](#) which apply to them.
 - (2) The manufacturer shall draw up a written EU declaration of conformity for each product model and keep it together with the technical documentation at the disposal of the national authorities for 10 years after the product has been placed on the market. The EU declaration of conformity shall clearly identify the product for which it has been drawn up.

A copy of the EU declaration of conformity shall be made available to the relevant authorities upon request.

5. **Authorised representative**

The manufacturers' obligations set out in point 4 may be fulfilled by an authorised representative, on their behalf and under their responsibility, provided that they are specified in the mandate.

PART 8 — Conformity assessment Modules B and C — EU-type examination and conformity to type based on internal production control

Regulation (EU) 2020/1058

When reference is made to this Part, the conformity assessment procedure shall follow Modules B (EU-type examination) and C (Conformity to type based on internal production control) of this Part.

Module B

EU-type examination

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](#).
2. EU-type examination shall be carried out by an assessment of the adequacy of the technical design of the product through examination of the technical documentation and supporting evidence referred to in point 3, plus examination of specimens, representative of the production envisaged, of one or more critical parts of the product (combination of production type and design type).
3. The manufacturer shall lodge an application for EU-type examination with a single notified body of his choice.

The application shall include:

- (1) the name and address of the manufacturer and, if the application is lodged by the authorised representative, his name and address as well;
- (2) a written declaration that the same application has not been lodged with any other notified body;
- (3) the technical documentation; the technical documentation shall make it possible to assess the product's conformity with the applicable requirements of this Regulation and shall include an adequate analysis and assessment of the risk(s); the technical documentation shall contain, wherever applicable, the elements set out in [Article 17](#) of this Regulation;
- (4) the specimens representative of the production envisaged; the notified body may request further specimens if needed for carrying out the test programme;
- (5) the supporting evidence for the adequacy of the technical design solution; this supporting evidence shall mention any documents that have been used, in particular where the relevant harmonised standards and/or technical specifications have not been applied or have not been applied in full; the supporting evidence shall include, where necessary, the results of tests carried out in accordance with other relevant technical specifications by the appropriate laboratory of the manufacturer or by another testing laboratory on his behalf and under his responsibility.

4. The notified body shall:

For the product:

- (1) examine the technical documentation and supporting evidence to assess the adequacy of the product's technical design.

For the specimen(s):

- (2) verify that the specimen(s) has (have) been manufactured in conformity with the technical documentation, and identify the elements which have been designed in accordance with the applicable provisions of the relevant harmonised standards and/or technical specifications, as well as the elements which have been designed without applying the relevant provisions of those standards;
 - (3) carry out appropriate examinations and tests, or have them carried out, to check whether, where the manufacturer has chosen to apply the solutions in the relevant harmonised standards and/or technical specifications, these have been applied correctly;
 - (4) carry out appropriate examinations and tests, or have them carried out, to check whether, where the solutions in the relevant harmonised standards and/or technical specifications have not been applied, the solutions adopted by the manufacturer meet the corresponding essential requirements of the legislative instrument;
 - (5) agree with the manufacturer on a location where the examinations and tests will be carried out.
5. The notified body shall draw up an evaluation report that records the activities undertaken in accordance with point 4 and their outcomes. Without prejudice to its obligations as provided in point 8, the notified body shall release the content of this report, in full or in part, only with the agreement of the manufacturer.
6. Where the type meets the requirements of this Regulation, the notified body shall issue an EU-type examination certificate to the manufacturer. This certificate shall contain the name and address of the manufacturer, the conclusions of the examination, the relevant aspects of the requirements covered by the examination, the conditions (if any) for its validity, and the data necessary for the identification of the approved type. The certificate may have one or more annexes attached to it.

The EU certificate and its annexes shall contain all relevant information to allow the conformity of manufactured products with the examined type to be evaluated and to allow for in service control.

Where the type does not satisfy the applicable requirements of this Regulation, the notified body shall refuse to issue an EU-type examination certificate and shall inform the applicant accordingly, giving detailed reasons for its refusal.

7. The notified body shall keep itself apprised of any changes in the generally acknowledged state of the art which indicates that the approved type may no longer comply with the applicable requirements of this Regulation, and shall determine whether such changes require further investigation. If so, the notified body shall inform the manufacturer accordingly.

The manufacturer shall inform the notified body that holds the technical documentation relating to the EU-type examination certificate of all modifications to the approved type that may affect the product's conformity with the essential requirements of this Regulation or the conditions for the certificate's validity. Such modifications shall require additional approval and attached to the original EU-type examination certificate.

8. Each notified body shall inform its notifying authority concerning the EU-type examination certificates and/or any additions thereto which it has issued or withdrawn, and shall, periodically or upon request, make available to its notifying authority the list of certificates and/or any additions thereto refused, suspended or otherwise restricted.

Each notified body shall inform the other notified bodies concerning the EU-type examination certificates and/or any additions thereto which it has refused, withdrawn, suspended or otherwise restricted, and, upon request, concerning the certificates and/or additions thereto which it has issued.

The Commission, the Member States and the other notified bodies may, on request, obtain a copy of the EU-type examination certificates and/or additions thereto. On a reasoned request, the Commission and the Member States may obtain a copy of the technical documentation and the results of the examinations carried out by the notified body.

The notified body shall keep a copy of the EU-type examination certificate, its annexes and additions, as well as the technical file including the documentation submitted by the manufacturer for 10 years after the product has been assessed or until the validity of the certificate expires.

9. The manufacturer shall keep a copy of the EU-type examination certificate, its annexes and additions together with the technical documentation at the disposal of the national authorities for 10 years after the product has been placed on the market.
10. The manufacturer's authorised representative may lodge the application referred to in point 3 and fulfil the obligations set out in points 7 and 9, provided that they are specified in the mandate.

Module C

Conformity to type based on internal production control

1. Conformity to type based on internal production control is the part of a conformity assessment procedure whereby the manufacturer fulfils the obligations laid down in points 2 and 3, and ensures and declares that the products concerned are in conformity with the type described in the EU-type examination certificate and satisfy the applicable requirements of this Regulation.

2. Manufacturing

The manufacturer shall take all measures necessary so that the manufacturing process and its monitoring ensure conformity of the manufactured product with the approved type described in the EU-type examination certificate and with the applicable requirements set out in Parts [1](#) to [6](#), [16](#) and [17](#).

3. CE marking and EU declaration of conformity

- (1) The manufacturer shall affix the CE marking and, when relevant, the UA class identification label in accordance with Articles [15](#) and [16](#) of this Regulation to each product that is in conformity with the type described in the EU-type examination certificate and satisfies the applicable requirements set out in Parts [1](#) to [6](#), [16](#) and [17](#).
- (2) The manufacturer shall draw up a written EU declaration of conformity for each product type and keep it at the disposal of the national authorities for 10 years after the product has been placed on the market. The EU declaration of conformity shall clearly identify the product type for which it has been drawn up.

A copy of the EU declaration of conformity shall be made available to the relevant authorities upon request.

4. Authorised representative

The manufacturer's obligations set out in point 3 may be fulfilled by their authorised representative, on their behalf and under their responsibility, provided that this is specified in the mandate.

PART 9 — Conformity assessment Module H — Conformity based on full quality assurance

Regulation (EU) 2020/1058

1. Conformity based on full quality assurance is the conformity assessment procedure whereby manufacturers fulfil the obligations set out in paragraphs 2 and 5, and ensure and declare on their sole responsibility that the product concerned satisfies the applicable requirements set out in Parts [1](#) to [6](#), [16](#) and [17](#).

2. Manufacturing

The manufacturer shall operate an approved quality system for design, manufacture, final inspection and testing of the product concerned as specified in point 3 and shall be subject to surveillance as specified in point 4.

3. Quality system

(1) The manufacturer shall lodge an application for the assessment of his quality system with the notified body of their choice, for the product concerned.

The application shall include:

- (a) the name and address of the manufacturer and, if the application is lodged by the authorised representative, their name and address as well;
- (b) the technical documentation for each type of product intended to be manufactured, containing the elements set out in [Part 10](#) where applicable;
- (c) the documentation concerning the quality system;
- (d) a written declaration stating that the same application has not been lodged with any other notified body.

(2) The quality system shall ensure compliance of the product with the requirements of this Regulation.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic and orderly manner in the form of written policies, procedures and instructions. This quality system documentation shall permit a consistent interpretation of the quality programmes, plans, manuals and records.

The documentation shall, in particular, contain an adequate description of:

- (a) the quality objectives and the organisational structure, responsibilities and powers of the management with regard to product design and quality;
- (b) the technical design specifications, including standards, that will be applied and, where the relevant harmonised standards will not be applied in full, the means that will be used to ensure that the requirements of this Regulation are met;

- (c) the design control and design verification techniques, processes and systematic actions that will be used when designing the products pertaining to the product type covered;
 - (d) the corresponding manufacturing, quality control and quality assurance techniques, processes and systematic actions that will be used;
 - (e) the examinations and tests that will be carried out before, during and after manufacture, and the frequency with which they will be carried out;
 - (f) the quality records, such as inspection reports and test data, calibration data, reports concerning the qualifications or approvals of the personnel concerned, etc.;
 - (g) the means of monitoring the achievement of the required design and product quality and the effective operation of the quality system.
- (3) The notified body shall assess the quality system to determine whether it satisfies the requirements referred to in point 3(2).

It shall presume conformity with those requirements in respect of elements of the quality system that comply with the corresponding specifications of the relevant harmonised standard.

In addition to experience in quality management systems, the auditing team shall have at least one member experienced as an assessor in the relevant product field and product technology concerned, and knowledge of the applicable requirements of this Regulation. The audit shall include an assessment visit on the manufacturer's premises. The auditing team shall review the technical documentation referred to in point 3(1)(b) to verify the manufacturer's ability to identify the applicable requirements of this Regulation and to carry out the necessary examinations with a view to ensuring the product's compliance with these requirements.

The manufacturer or his authorised representative shall be notified of the decision.

The notification shall contain the conclusions of the audit and the reasoned assessment decision.

- (4) The manufacturer shall undertake to fulfil the obligations arising out of the quality system as approved and to maintain it so that it remains adequate and efficient.

The manufacturer shall keep the notified body that has approved the quality system informed of any intended change to the quality system.

- (5) The notified body shall evaluate any proposed changes and decide whether the modified quality system will continue to satisfy the requirements referred to in point 3(2) or whether a reassessment is necessary.

The notified body shall notify the manufacturer of its decision. The notification shall contain the conclusions of the examination and the reasoned assessment decision.

4. Surveillance under the responsibility of the notified body

- (1) The purpose of surveillance is to make sure that the manufacturer duly fulfils the obligations arising out of the approved quality system.
- (2) The manufacturer shall, for assessment purposes, allow the notified body access to the design, manufacture, inspection, testing and storage sites, and shall provide it with all necessary information, in particular:

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- (a) the quality system documentation;
 - (b) the quality records as provided for by the design part of the quality system, such as results of analyses, calculations, tests, etc.;
 - (c) the quality records as provided for by the manufacturing part of the quality system, such as inspection reports and test data, calibration data, reports concerning the qualifications of the personnel, etc.
 - (3) The notified body shall carry out periodic audits to make sure that the manufacturer maintains and applies the quality system and shall provide the manufacturer with an audit report.
 - (4) In addition, the notified body may pay unexpected visits to the manufacturer. During such visits, the notified body may, if necessary, carry out UA or UAS tests, or have them carried out, in order to check the proper functioning of the quality system. It shall provide the manufacturer with a visit report and, if tests have been carried out, with a test report.
5. CE marking and EU declaration of conformity
- (1) The manufacturer shall affix the CE marking and, when relevant, the UAS class identification label in accordance with Articles [15](#) and [16](#) of this Regulation and, under the responsibility of the notified body referred to in point 3(1) of this Part, the latter's identification number to each individual product that satisfies the applicable requirements of this Regulation.
 - (2) The manufacturer shall draw up a written EU declaration of conformity for each product type and keep it at the disposal of the national authorities for 10 years after the product has been placed on the market. The EU declaration of conformity shall identify the product type for which it has been drawn up.
- A copy of the EU declaration of conformity shall be made available to the relevant authorities upon request.
6. The manufacturer shall, for a period ending 10 years after the product has been placed on the market, keep at the disposal of the national authorities:
- (1) the technical documentation referred to in point 3(1);
 - (2) the documentation concerning the quality system referred to in point 3(1);
 - (3) the change referred to in point 3(5), as approved;
 - (4) the decisions and reports of the notified body referred to in points 3(5), 4(3) and 4(4).
7. Each notified body shall inform its notifying authority of the quality system approvals issued or withdrawn, and shall, periodically or upon request, make available to its notifying authority the list of the quality system approvals it has refused, suspended or otherwise restricted.
- Each notified body shall inform the other notified bodies of the quality system approvals which it has refused, suspended or withdrawn, and, upon request, of quality system approvals which it has issued.
8. Authorised representative
- The manufacturer's obligations set out in points 3(1), 3(5), 5 and 6 may be fulfilled by their authorised representative, on their behalf and under their responsibility, provided that this is specified in the mandate.

PART 10 — Contents of the technical documentation

Regulation (EU) 2020/1058

The manufacturer shall establish the technical documentation. The documentation shall make it possible to assess the product's conformity to the applicable requirements.

The technical documentation shall, wherever applicable, contain at least the following elements:

1. a complete description of the product including:
 - (a) photographs or illustrations showing its external features, markings and internal layout;
 - (b) the versions of any software or firmware involved in compliance with the requirements set by this Regulation;
 - (c) manufacturer's and installation instructions;
2. conceptual design and manufacturing drawings and schemes of components, sub-assemblies, circuits and other relevant similar elements;
3. descriptions and explanations necessary for the understanding of those drawings and schemes and the operation of the product;
4. a list of the harmonised standards applied in full or in part, the references of which have been published in the *Official Journal of the European Union*, and, where those harmonised standards have not been applied, descriptions of the solutions adopted to meet the essential requirements set out in [Article 4](#), including a list of other relevant technical specifications applied. In the event of partly applied harmonised standards, the technical documentation shall specify the parts which have been applied;
5. copy of the EU declaration of conformity;
6. where the conformity assessment module in Part 8 has been applied, copy of the EU-type examination certificate and its annexes as delivered by the notified body involved;
7. results of design calculations made, examinations carried out, and other relevant similar elements;
8. test reports;
9. copies of the documents that the manufacturer has submitted to the notified body if any involved;
10. the supporting evidence for the adequacy of the technical design solution. This supporting evidence shall mention any documents that have been used, in particular where the relevant harmonised standards and/or technical specifications have not been applied in full. The supporting evidence shall include, where necessary, the results of tests carried out by the appropriate laboratory of the manufacturer, or by another testing laboratory on his behalf and under his responsibility;
11. addresses of places of manufacture and storage.

PART 11 — EU declaration of conformity

Regulation (EU) 2020/1058

1. The product (type, batch and serial number).
2. Name and address of the manufacturer or his authorised representative.
3. This declaration of conformity is issued under the sole responsibility of the manufacturer. *[in case of a kit of accessories, the manufacturer of the kit may indicate that this certificate relies on the certificate of the UAS which the kit ensures the conversion.]*
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]*.
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]*.
6. The guaranteed sound power level for this UAS equipment is ... dB(A) *[for non fixed-wing UAS classes 1 to 3 only]*
7. The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:
 - *[include the reference to this Regulation and the Annex relevant to the class of the product];*
 - or other Union harmonisation legislation where applicable.
8. References to the relevant harmonised standards used or references to the other technical specifications in relation to which conformity is declared. References must be listed with their identification number and version and, where applicable, date of issue.
9. Where applicable, the notified body ... *[name, number]* ... performed ... *[description of intervention]* ... and issued the EU-type examination certificate.
10. Where applicable, a description of accessories and components, including software, which allow the unmanned aircraft or unmanned aircraft system to operate as intended and covered by the EU declaration of conformity.
11. Additional information:
Signed for and on behalf of: ...
[place and date of issue]:
[name, function] [signature]:

PART 12 — Simplified EU declaration of conformity

Regulation (EU) 2020/1058

The simplified EU declaration of conformity referred to in [Article 14](#)(3) shall be provided as follows:

- *[Name of manufacturer]* hereby declares that the UAS *[identification of the UAS: type or serial number]* is of class ... *[for UAS include the class number of the product as defined in Parts [1](#) to [5](#), [16](#) and [17](#) of this Annex; for a kit of accessories, indicate the class into which the UAS is converted]* and has a guaranteed sound power level of ... dB(A) *[for non fixed-wing UAS classes 1, 2, 3, 5 and 6 only]*

- and in compliance with Regulations ... *[list all the Regulations that the product complies with]*.
- The full EU declaration of conformity is accessible at the following website: *[website address]*

PART 13 — Noise test code

Regulation (EU) 2020/1058

This Part lays down the methods of measurement of airborne noise that shall be used for the determination of the measured A-weighted sound power levels of UA classes 1, 2, 3, 5 and 6.

It lays down the basic noise emission standard and detailed test code for measuring the sound pressure level on a measurement surface enveloping the source and for calculating the sound power level produced by the source.

1. BASIC NOISE EMISSION STANDARD

For the determination of the A-weighted sound power level L_{WA} of UA, the basic noise emission standards EN ISO 3744:2010 will be used subject to the following supplements:

2. INSTALLATION AND MOUNTING CONDITIONS

Test area:

The UA will be maintained above one reflecting (acoustically hard) plane. The UA shall be located at a sufficient distance from any reflecting wall or ceiling or any reflecting object so that the requirements given in Annex A of EN ISO 3744:2010 are satisfied on the measurement surface.

Sound measurement surface and microphone array:

The UA will be completely enclosed in a hemispherical measurement surface as per § 7.2.3 of EN ISO 3744:2010.

The number and position of the microphones is defined by Annex F of EN ISO 3744:2010.

The measurement surface shall have its origin at the point O lying in the ground plane directly below the UA.

3. OPERATING CONDITIONS DURING TEST

The noise tests shall be carried out with the UA's rotors operating at a speed corresponding to the hovering of the UA under MTOM.

If the UA is placed on the market with accessories that can be fitted to it, it will be tested with and without these accessories in all possible UA configurations.

4. CALCULATION OF SURFACE TIME-AVERAGED SOUND PRESSURE LEVEL

The A-weighted surface time-averaged sound pressure level shall be determined at least three times for each UA configuration. If at least two of the determined values do not differ by more than 1 dB, further measurements will not be necessary; otherwise the measurements shall be continued until two values differing by no more than 1 dB are obtained. The surface time-averaged sound pressure level to be used for calculating the sound power level of a UA configuration is the arithmetic mean of the two highest values that do not differ by more than 1 dB.

5. INFORMATION TO BE REPORTED

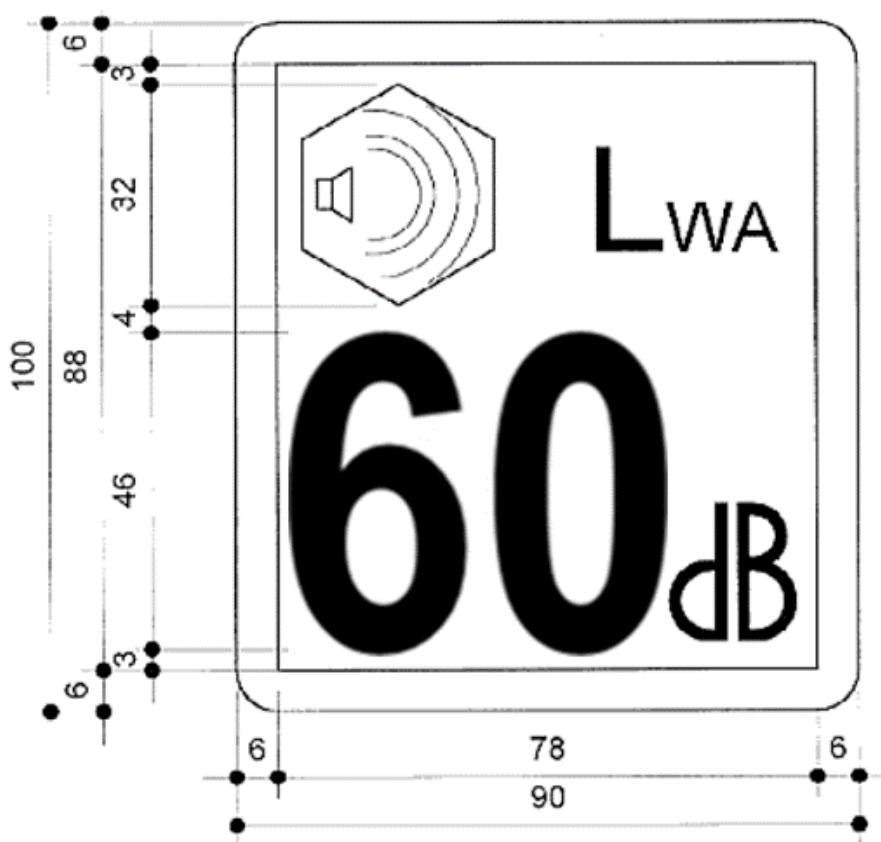
The report shall contain the technical data necessary to identify the source under test as well as the noise test code and the acoustical data.

The A-weighted sound power level value to be reported is the highest value of the different UA configurations tested rounded to the nearest whole number (less than 0,5 use the lower number; greater than or equal to 0,5 use the higher number).

PART 14 — Indication of the guaranteed sound power level

Regulation (EU) 2020/1058

The indication of the guaranteed sound power level must consist of the single number of the guaranteed sound power in dB, the sign L_{WA} and a pictogram taking the following form:



If the indication is reduced according to the size of the equipment the proportions given in the above drawing must be respected. However, the vertical dimension of the indication should, if possible, not be less than 20 mm.

PART 15 — Maximum sound power level per class of UA (including transition periods)

Regulation (EU) 2020/1058

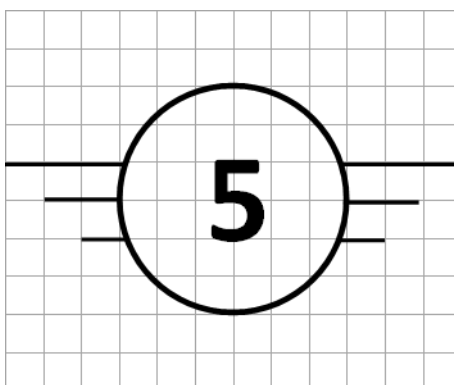
UA class	MTOM m in gram	Maximum sound power level L_{WA} in dB		
		as from entry into force	as from 2 years after entry into force	as from 4 years after entry into force
C1 and C2	$m < 900$	85	83	81
C2	$900 \leq m < 4\,000$	$85 + 18,5 \lg \frac{m}{900}$	$83 + 18,5 \lg \frac{m}{900}$	$81 + 18,5 \lg \frac{m}{900}$

Where 'lg' is the base 10 logarithm.

PART 16 — Requirements for a class C5 unmanned aircraft system and C5 accessories

Regulation (EU) 2020/1058

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 those defined in paragraphs (2) and (10) of [Part 4](#).

In addition, it shall comply with the following requirements:

- (1) be an aircraft other than a fixed-wing aircraft unless tethered;
- (2) if it is equipped with a geo-awareness function, comply with paragraph (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 quality of the command and control link and receive an alert when it is likely that the link is going to be lost or degraded to the extent of compromising the safe conduct of the operation, and another alert when the link is lost; and
- (7) in addition to the information indicated in point (15)(a) of [Part 4](#), include in the manufacturer's instructions a description of the means to terminate the flight required in point (5).
- (8) A class C5 UAS may consist in a class C3 UAS fitted with an accessories kit that ensures the conversion of the UAS C3 into a class C5 UAS. In this case, the class C5 label shall be affixed on all the accessories.

An accessories kit may only ensure conversion of a class C3 UAS that complies with point (1) and provides the necessary interfaces to the accessories.

The accessories kit shall not include changes to the software of the class C3 UAS.

The accessories kit shall be designed, and each accessory shall be identified, to ensure a complete and correct installation by a UAS operator on a class C3 UAS following the instructions provided by the manufacturer of the accessories kit.

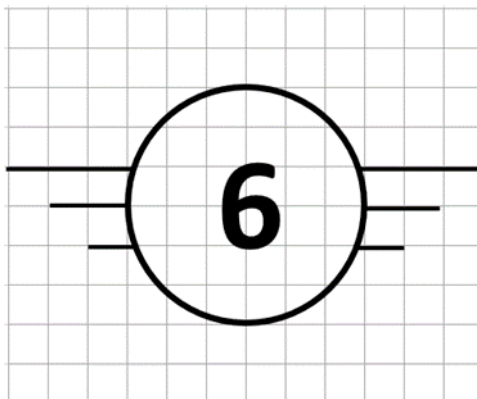
The accessories kit may be placed on the market independently from the class C3 UAS for which they ensure the conversion. In this case, the manufacturer of the accessories kit shall place on the market a single conversion kit that shall:

- (1) not alter the compliance of the class C3 UAS with the requirements of Part 4;
- (2) ensure compliance of the UAS fitted with the accessories kit with all additional requirements defined in this Part with the exception of point (3) above; and
- (3) be accompanied by manufacturer's instructions providing:
 - (i) the list of all class C3 UAS to which the kit can be applied; and
 - (ii) instructions on how to install and operate the accessories kit.

PART 17 — Requirements for a class C6 unmanned aircraft system

Regulation (EU) 2020/1058

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 those defined in paragraphs (2), (7) and (10).

In addition, it shall comply with the following requirements:

- (1) 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, comply with paragraph (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 operational volume;
- (5) provide means for the remote pilot to terminate the flight of the UA, which shall:
 - (a) be reliable, predictable, independent from the automatic flight control and guidance system and independent from the means to prevent the UA from breaching the horizontal and vertical limits as required in point (4); 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) provide the remote pilot with means to continuously monitor the quality of the command and control link and receive an alert when it is likely that the link is going to be lost or degraded to the extent of compromising the safe conduct of the operation, and another alert when the link is lost; and
- (8) in addition to the information indicated in point (15)(a) of [Part 4](#), include in the manufacturer's instructions:
 - (a) a description of the means to terminate the flight required in point (5);
 - (b) a description of the means to prevent the UA from breaching the horizontal and vertical limits of the operational volume and the size of the contingency volume needed to accommodate position assessment error, reaction time and correction manoeuvre span; and

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