MINISTERO DELLA DIFESA

Segretariato Generale della Difesa e Direzione Nazionale Armamenti

Direzione degli Armamenti Aeronautici e per l'Aeronavigabilità

CERTIFICATION

OF

MILITARY REMOTELY PILOTED AIRCRAFT SYSTEMS

Edition 17th November 2023

LIST OF EFFECTIVE PAGES

NOTE: This standard is valid if it consists of the pages listed below, duly updated.

Copy of this Technical Publication may be found at the address:

http://www.difesa.it/SGD-DNA/Staff/DT/ARMAEREO/Biblioteca/Pagine/default_.aspx

The issue dates of the original and amended pages are:

Original…….. 0…….. 17 th November 2023

This standard consists of a total of N° 61 pages as specified below:

Page N°	**Amendment N°**
Frontpage……..	0
A……..	0
i……..	0
1 - 23…….	0
Att. A pages A1-A4……..	0
Att. B pages B1-B7……	0
Att. C pages C1-C3…	0
Att. D pages D1-D5..…	0
Att. E pages E1-E6……	0
Att. F pages F1-F9….....	0
Att. G pages G1-G2	0

INDEX

ATTACHMENT LIST

1. INTRODUCTION

1.1. GENERAL

The capability to employ the Remotely Piloted Aircraft Systems (RPAS) carries a significant operational value within the Italian and the international military strategic contexts. Such requirement has brought an exponential increment of the demands for military RPAS acquisition, procurement and certification, with a remarkably wide variety of RPAS applications (from recognition to air-to-surface attack), relevant weight category (from a few grams up to many tons), origin (some Systems are derived from a purely military design, others are originated from a civil project, subsequently tailored for military scopes).

This scenario, highly dynamic, necessitates mechanisms for certification and flight authorization of equal flexibility and incremental modularity, cognizant and proportional to the actual Concept of Operation/Operational Requirement Specification (CONOPS/ORS), the inherent envelope of employment and the associated risks.

More specifically:

- the certification strategy, and the relevant effort, requires a diversification, which depends on the real RPAS operational context and is accordingly sized up, in terms of volume of the activities to carry and the evidence to collect;
- the identification of the System Design Responsible (SDR) or the Military Design Organization (MDOA), as defined in the norms AER(EP).00-00-5 and AER(EP).P-21, results in some cases particularly difficult, especially for the Systems of pure commercial derivation, where the Company distributing the product in Italy is not in possession of the technical know-how (or viable and equivalent agreements with the actual designer of the items) to satisfactorily fulfil the relevant obligations; in this context, it is therefore necessary to expand the range of possible options, so to guarantee a minimum level of liability and supportability to the programmes;
- the military RPAS certification, historically based on the computation of the maximum density for overflown population in case of non-compliance with some certification requirements, as prescribed in the norms AER(EP).P-2 and AER(EP).P-6, proved not easily applicable, due to the relevant dependency on demographic models obsolete (the last population screening was actively completed in Italy in the late 90ties) and static (i.e. not dependent on the particular season or time of the day). This approach, which has brought significant operational limitations and did not bolster the process of integration of the RPAS into the civil general aerospace, requires a re-visitation and further customization;
- especially in the cases of RPAS below 25 Kg, the evolutionary curve of the enabling technologies is particularly steep, with frequent and constant updates, which make the Systems soon obsolete (as for the smartphones); in these circumstances, it is fundamental to adopt certification mechanisms commensurable with the rapid pace of change.

On this regard, the approach scenario/risk based captured by the European Aviation

and Safety Agency (EASA) in the Specific Operational Risk Assessment (SORA) methodology, represents an innovation with respect to the classic strategy, scenario agnostic, followed by the DAAA for the release of a Military Type Certificate (MTC). Likewise, the Military UAS Specific Risk Assessment (MUSRA) methodology, redacted by the European Defence Agency (EDA) for the calculation of the third party risks, offers valid elements to render more flexible the application of maximum population density.

1.2. PURPOSE

The purpose of this Technical Publication (TP) is to define the military RPASs certification strategy based on the following key principles:

- taking credit from the approach delineated by EASA, by transposing the motto "as civil as possible, as military as necessary", and expanding the range of available certification options;
- including the operational scenario defined in the CONOPS/ORS in the debate for defining the most suitable certification product;
- making the certification tools more flexible, also in terms of third party safety risks.

1.3. APPLICABILITY

The present TP is applicable to all Italian military RPAS operating on the national territory and the State RPAS.

This TP will also be adopted to support flight authorization of foreign RPAS employing the Italian Air Space and facilities in a military context[1].

1.4. VALIDITY

The present TP shall enter into force on the date of its approval.

1.5. DEFINITIONS AND GLOSSARY

- ***Airworthiness:*** refer to the norms AER(EP).P-2 and AER(EP).P-21.
- ***Certification Basis:*** for the general definition, refer to the norms AER(EP).P-2 and AER(EP).P-21. In the specific case of the RPASs, the Certification Basis is built as a combination, down-selection, customization of the following items: RPAS checklist/IAC, STANAG 4671 (reference [5]), STANAG 4702 (reference [6]), STANAG 4703 (reference [7]), STANAG 4746 (reference [8]).
- ***Certification Technical Report*****:** refer to the norms AER(EP).P-2 and AER(EP).P-21.
- ***Company designing the System:*** refer to the definitions reported in the EASA norm at reference [2]. For brevity, in the rest of this TP it may also be generically referred to as "the Company". It is identified as any natural or legal person who manufactures the product or has a product designed or manufactured, and markets that product under their name or trademark.
- ***Company importing the System:*** refer to the definitions reported in the EASA norm at

[1] For instance, the foreign RPAS (not necessarily military) owned by a foreign country, operated by a foreign operator in the context of a military international exercise carried out in Italy; or the case of the overfly of the Italian Air Space by a foreign NATO military RPAS.

reference [2]. For brevity, in the rest of this TP it may also be generically referred to as “the Company”. It means any natural or legal person established within the Union who places a product from a third country on the Union market.

- ***Company distributing the System:*** refer to the definitions reported in the EASA norm at reference [2]. For brevity, in the rest of this TP it may also be generically referred to as “the Company”. 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.
- ***Company System Design Responsible*****:** refer to the definitions reported in the DAAA norm AER(EP).00-00-5. For brevity, in the rest of this TP it may also be generically referred to as “the Company”.
- ***Company Design Military Organization/Production Approval:*** refer to the definitions reported in the DAAA norm AER(EP).P-21. For brevity, in the rest of this TP it may also be generically referred to as “the Company”.
- ***CONOPS*****/*****ORS*****:** it is a programmatic document defining the scenario and the operational need which generate a particular set of high level technical and operational requirements, to be fulfilled through the achievement of a novel operational capability. It generally entails the information and indications about the aspired flight envelope, the mission planning, execution and reporting, the sustainability, maintainability, logistic support, etc.
- ***Density of overflown population:*** the basic definition of this concept is included in the norms AER(EP).P-2 and AER(EP).P-6. The present TP will establish the methodology to calculate such attribute. More details are reported in Attachment F.
- ***Involved persons:*** all personnel (military or civil) employed in the military articulation(s) involved in the use of the RPAS under scrutiny. In other words, to make an example, when the RPAS is utilized in a military base, the personnel employed in that base and those utilizing the RPAS are to be considered “involved”, even in the case of not actively participating to the particular operational activity. This concept contraposes with “uninvolved people”, generally paired with the civilians completely extraneous to the military context.
- ***Notifying body: refer to the EU norm at reference [3].*** It refers to 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.
- ***Military Aviation Authority:*** it is identified with the “Ufficio Generale Aviazione Militare e Meteorologia “(AVIAM) office at the Italian Air Staff.
- ***Military RPAS, RPAS equivalent to a military RPAS, RPAS of military use or State RPAS:*** refer to definitions included in the Code of Aerial Navigation at reference [1], articles 744, 745, 746 and 748. In the rest of this TP it will simplistically referred to as RPAS. For brevity, in the rest of the document it may also be generically referred to as "the System".
- ***Military Type Certificate:*** refer to the norms AER(EP).P-2 and AER(EP).P-21.
- ***Operational Military Permit to Fly:*** refer to the norm AER(EP).P-7.
- ***Residual risk:*** in accordance with the STANAG 7160 [10] and the MIL-STD-882 [11], it refers to the airworthiness risks attributed to a weapon system design. The airworthiness risk is determined at the beginning of a system design and then constantly updated as

the design matures to its final configuration, until the achievement of a flight certification/flight clearance. The risks not fully mitigated through design measures, or operational/procedural recommendations, are defined as residual risks. For further details about the determination of the residual risk, refer to the norm AER(EP)P.-23.

- ***Restricted Military Type Certificate:*** refer to the norms AER(EP).-2 and AER(EP).P-21.
- ***RPAS category micro*****:** it refers to a type of RPAS classification based on the Maximum Take Off Weight (MTOW) below 2 Kg. Refer to the norm AER(EP).P-7 for further details.
- ***RPAS category mini*****:** it refers to a type of RPAS classification based on the MTOW between 2 and 25 Kg. Refer to the norm AER(EP).P-7 for further details.
- ***RPAS category light*****:** it refers to a type of RPAS classification based on the MTOW between 25 and 150 Kg. Refer to the norm AER(EP).P-7 for further details.
- ***RPAS category tactical*****:** it refers to a type of RPAS classification based on the MTOW between 150 and 500 Kg. Refer to the norm AER(EP).P-7 for further details.
- ***RPAS category strategic*****:** it refers to a type of RPAS classification based on the MTOW above 500 Kg. Refer to the norm AER(EP).P-7 for further details.
- ***RPAS checklist:*** it is consists of a number of questions pertaining the technical, organizational, safety features of an RPAS. It is also referred to as Integrity Assessment Checklist (IAC). Refer to AER(EP).P-516.
- ***RPAS civil flight category A1*****:** refer to the definitions reported in the EASA norm at reference [3]. It refers to those RPAS bound not to overfly assembly of people, has a MTOW below 250 g, maximum operating speed of 19 m/s, maximum height above the operator of 120 meters and maximum 50 meters from him, and is marked CE civil class open C0 or C1.
- ***RPAS civil flight category A2:*** refer to the definitions reported in the EASA norm at reference [3]. It refers to those RPAS bound not to overfly assembly of people and be kept at least 30 meters from uninvolved persons, has a MTOW below 4 Kg, maximum operating speed of 19 m/s, maximum height above the operator or 120 meters and is marked CE civil class open C2.
- ***RPAS civil flight category A3*****:** refer to the definitions reported in the EASA norm at reference [3]. It refers to those RPAS bound not to overfly assembly of people and be kept at least 150 metres from residential, commercial, industrial or recreational areas, has a MTOW below 25 Kg, maximum operating speed of 19 m/s, maximum height above the operator or 120 meters, and is marked CE civil class open C2, C3 or C4.
- ***RPAS class civil open:*** refer to the definitions reported in the EASA norms at reference [2] and [3], in terms of C0-C4 classes. Class C0 has a MTOW below 250 g, class C1 has a MTOW below 900 g, class C2 has a MTOW below 4 Kg, class C3 has a MTOW below 25 Kg and dimensions contained within 3 meters, class C4 only refers to a MTOW below 25 Kg.
- ***RPAS class civil specific*****:** refer to the definitions reported in the EASA norms at reference [2] and [3]. It defines every RPAS flying in flight envelopes exceeding the A1-A3 categories or trespassing the boundaries of the civil open C0-C4 classes. To be granted flight authorization, it is accompanied by a Specific Operational Risk Assessment (SORA).
- ***RPAS class civil certified*****:** refer to the definitions reported in the EASA norms at

reference [2] and [3].

- ***RPAS user:*** it is identified with the articulation, belonging to the Italian State and military entities not subject to the Code of Aerial Navigation (as per articles 744-748), originators of the CONOPS/ORS and responsible for the Operational employment of the RPAS.
- ***Technical Data Sheet*****:** refer to the norms AER(EP).P-2 and AER(EP).P-21.
- ***Uninvolved persons:*** see the definition of “involved persons”.

1.6. ACRONYMS

ADS-B	Automatic Dependent Surveillance - Broadcast
ATC	Air Traffic Controller
CONOPS	Concept of Operations
CTR	Certification Technical Report
DAAA	Military Aiworthiness Authority
DPmax	Maximum density of overflown population
EASA	European Aviation and Safety Agency
EDA	European Defence Agency
FTA	Fault Tree Analysis
GPWS	Ground Proximity Warning System
ICA	Integrity Assessment Checklist
IFR	Instrument Flight Rules
MAA	Military Aviation Authority
MDOA	Military Design Organization Approval
MTC	Military Type Certificate
MTOW	Maximum TakeOff Weight
MUSRA	Military UAS Specific Risk Assessment
O-MPfT	Operational Military Permit to Fly
ORS	Operational Requirements Specification
OSO	Operational Safety Objectives
P_Cum_Cat	Probablity of Cumulative Catatrophic Event
QLPD	Qualitative Level of Population Density
R-MTC	Resctricted Military Type Certificate
RPAS	Remotely Piloted Aircraft System
RR	Residual Risk
SAIL	Specific Assurance Integrity Level

SC	Safety Case
SDR	System Design Responsible
SORA	Specific Operational Risk Assessment
TA	Technical Assessment
TCAS	Traffic Collision Avoidance System
TAWS	Traffic Avoidance Warning System
TDS	Technical Data Sheet
TP	Technical Procedure
UAS	Unmanned Aircraft System
VFR	Visual Flight Rules

1.7. REFERENCE DOCUMENTS

[1] Code of Aerial Navigation, approved through R.D. 30 March 1942, n. 327 (and subsequent amendments)

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

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

[4] EUROUSC/Leonardo MIL-UAS-SPECIFIC: Methodology update, Rev. 01, 13 January 2023

[5] STANAG 4671: Unmanned Aircraft Systems Airworthiness Requirements (USAR)

[6] STANAG 4702: Rotary wing unmanned aircraft systems airworthiness requirements

[7] STANAG 4703: Light Unmanned Aircraft Systems Airworthiness Requirements

[8] STANAG 4746: Unmanned Aerial Vehicle (UAV) Systems Airworthiness Requirements (USAR) for Light Vertical Take Off and Landing (VTOL) Aircraft

[9] EASA - SORA Workshop from version 2.0 to 2.5, 9-10 February 2023

[10] STANAG 7160: Aviation safety

[11] MIL-STD-882A (and subsequent editions): Department of Defence standard practise, System safety

1.8. CORRELATED DAAA NORMS

AER(EP).00-00-5	Configuration control processes for the preparation, evaluation and approval of amendments to material under GDAA responsibility
AER(EP).P-2	Military type system certification, qualification and fit-for-installation
AER(EP).P-6	Instructions for the compilation of technical specifications for military aircrafts
AER(EP).P-7	Regulation for recording and maintaining the Military Aircraft Register
AER(EP).P-21	Certification of Military Aircraft and related Products, Parts and Appliances, and Design and Production Organizations
AER(EP).P-516	Airworthiness requirements criteria definition
AER(EP).P-23	Residual Risk definition and acceptance

2. PROCEDURE DESCRIPTION

2.1. GENERAL

The graph in figure 1 shows a pictorial description of the process, which consists of the following basic principles:

- definition of the expected RPAS operational spectrum, through a bespoke kickoff meeting involving the DAAA, the MAA and the RPAS user;
- introduction of three military RPAS certification categories, sorted in ascending maturity of the certification: open, specific and certified; the relative allocation depends on the level of maturity achievable by the RPAS design and the Company, and is confronted with the technical-operational-organizational level of ambition defined in the CONOPS/ORS; on this regard, no military certification categories are pre-emptively precluded, and will be debated and agreed during the kickoff meeting;
- identification, for each of the three mentioned certification categories, of a given set of input information, to be redacted in collaboration with the Company (if feasible), and of associated deliverables, produced by the DAAA;
- for all the Systems deriving from a civil design, recognition of the evaluation activities carried out by the parent competent European authorities (Notifying Body and/or EASA) and translation, as default, of the relevant civil certificate into an equivalent military version, augmented with dedicated technical and safety analyses performed by the DAAA; the extent and the type of these extra verifications depend on the level of maturity of the original RPAS design and the Company;
- in the case where a Probability of Cumulative Catastrophic Event (P_Cum_Cat) and/or a Fault Tree Analysis (FTA) are available, determination of the maximum density of overflown population, in a unique value, or segmented by the different phases of flight (typically taxi, takeoff, cruise, operational activity, return to base, approach and landing) [2], so to compensate possible non-compliances with the certification requirements;[3]
- utilization of such numerical values to assign Qualitative Levels of Population Density (QLPD);
- identification of the Residual Risks (RR), estimated after the application of all the operational-technical-procedural mitigations and limitations captured in the bespoke DAAA deliverables;
- sharing and acceptance of these RRs among the DAAA, the MAA and the RPAS

[2] In this second case, the availability of an FTA should provide sufficient granularity to isolate the failure conditions associated to a particular phase of flight, so to be able to calculate the P_Cum_Cat allocated to that specific phase of flight

[3] It is important to highlight, on this regard, that limitations to the overflown population may also be applied to compensate for other types of non-compliances, generally not modelled by a numeric probability. For instance, for shortfalls in terms of software development and qualification, it may be necessary to limit the employment of the RPAS over unpopulated areas. This kind of imposition may be flatly applied over the entire mission, and not segmented with the phases of flight

user, with a progressive increment of the responsibility and liability bestowed on the DAAA, as the design of the System and the organizational performance of the Company evolve from the certification category military open to the achievement of a full MTC.

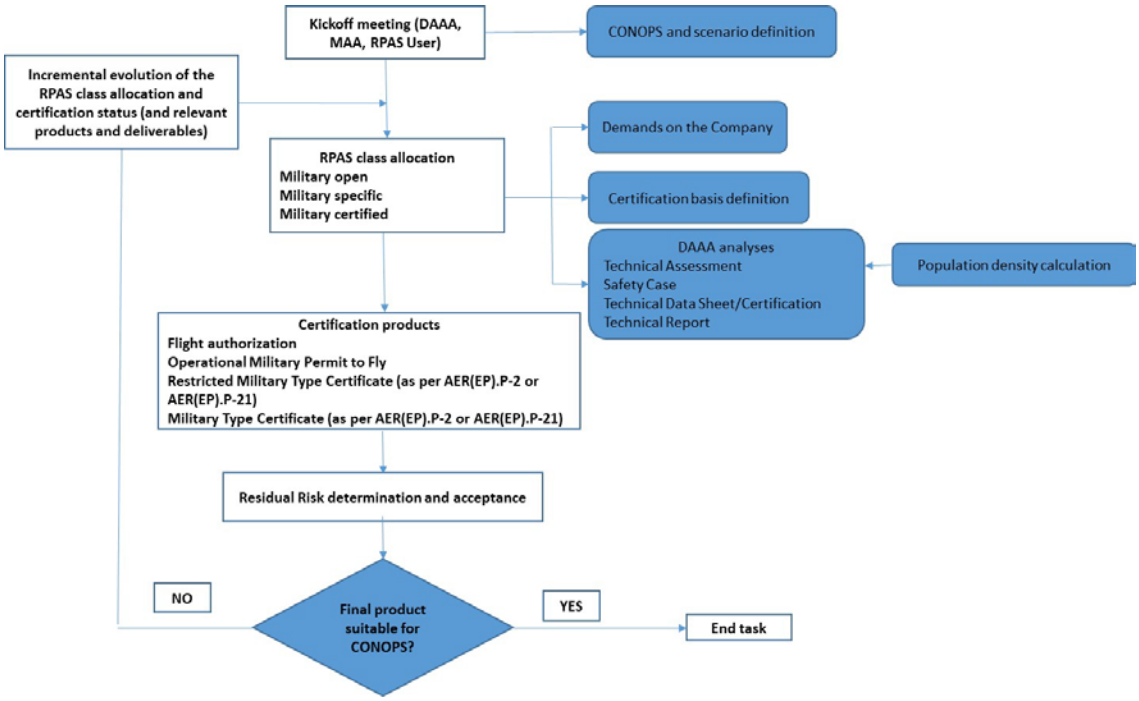


Figure 1: RPAS certification flow chart

In terms of flight certification it is important to highlight that:

- the certification category military open will not be provided with a military type certificate, but just with a technical clearance redacted by the DAAA, for the subsequent flight authorization by the MAA;
- the certification category military specific will not be provided with an MTC, but be accompanied either by a technical clearance as per military open category, or by an Operational Military Permit to Fly (O-MPtF) released by the DAAA in accordance with the norm AER(EP).P-7; in both cases the flight authorization is produced by the MAA;
- the certification category military certified will deliver a full MTC or a Restricted MTC (R-MTC), in accordance with the procedures set in the norms AER(EP).P-2 and AER(EP).P-21; the R-MTC will necessitate of a further authorization by the MAA, in terms of operational plan (corridors, separation, departure and landing procedures, etc.).

The following paragraphs will provide more details on the fundamental concepts of the certification process:

- the kickoff meeting;
- the RPAS certification category allocation;
- the demands on the Company;
- the Certification Basis definition;
- the DAAA analyses, including the population density calculation, whenever

applicable and necessary;
- the certification products;
- the RR determination and acceptance;
- the task closure.

2.2. KICKOFF MEETING

The meeting involves the DAAA, the MAA, the RPAS User and, if feasible, the Company, and has the scope of discussing the following topics:

- presentation of the RPAS under scrutiny and of the correlated available information;
- expected operational scenario in terms of flying envelope, area of operation (with a particular emphasis posed on the foreseen population density), environmental conditions (wind, day/night operations, etc.), command and control range (Line Of Sight or Beyond), maximum expected distance and altitude with respect to the operator;
- RPAS payload type, carriage of explosive/dangerous material;
- time constraints and deadlines allocated to the programme;
- procurement mechanisms/contracts;
- available previous civil/military certifications/flight authorizations;
- Company (potential) accreditations against the requirements set for an SDR, an MDOA, or simply a Company designing/importing/distributing the System as per EASA norm at reference [2].

Such discussions aim at:

- establishing a set of minimum high level technical-operational-organizational requirements, to weigh the RPAS and the Company maturity against;
- delineating and sharing the certification strategy across the stakeholders, the collection and production of the necessary evidence and the relevant potential residual risks;
- determining the target and the achievable RPAS military certification category, based on the preliminary evaluation of the above-listed information and in accordance with the agreed certification strategy.

On this regard, it is important to highlight that the RPAS certification could be fragmented into different steps, starting with an initial flight authorization corresponding to a military open. Then, as the maturity of the design and of the Company increases, the fulfilment of more stringent requirements could be achieved. This kind of arrangements will also be debated during the kickoff meeting.

One additional point worth re-enforcing is that this new approach is scenario-oriented; therefore, the same RPAS utilized in a different operational mission will require a replication of all the steps here described.

2.3. RPAS CERTIFICATION CATEGORY ALLOCATION

The allocation of the RPAS certification category is performed through the application of the following rules:

- if the System carries a civil open authorization (MTOW below 25 Kg), it can be immediately translated into a military open, by applying the same civil flight categories A1-A3, augmented by a bespoke DAAA analysis;
- if the System carries a civil open authorization (MTOW below 25 Kg), but the spectrum defined at the previous bullet-point is not compatible with the flight envelope depicted in the CONOPS/ORS, then the RPAS will enter the certification category military specific, where the information already available may be implemented by additional bespoke DAAA analyses (also in terms of Certification Basis and organizational requirements to the Company);
- the same as per previous two bullet-points applies for those civil RPASs (MTOW below 25 Kg), registered/imported before the entry into force of the EASA regulation at reference [2] and [3];
- if the System already carries a civil specific authorization (any MTOW), it can be translated into a military specific, the relevant SORA and Operational Safety Objectives (OSOs) utilized as a basis to build the DAAA analyses;
- if the System carries a civil certification (any MTOW), then it can be translated into a military certified, provided that no additional military requirements are implemented;
- if the System carries a civil certification (any MTOW), but the relevant cleared flight envelope does not match with the CONOPS/ORS (or the characteristics of the approved envelope do not fit the airworthiness requirements of the military authority), the differential certification activity may bring to either a military specific or a military certified, depending on the maturity of the collected evidence;
- if the System carries a military clearance (open, specific, certified), it can transfer its original clearance into the new programme, provided that the relevant spectrum is compatible with the CONOPS/ORS; otherwise it will be evolved and expanded;
- if the System originates from a military design but carries no previous military clearances (or is in possession of a civil authorization with uncertified bespoke military fittings) it can attain any of the 3 certification categories, depending on the CONOPS/ORS, the urgency of the operational need and its MTOW (for instance, an RPAS below 25 Kg of purely military origin can initially achieve a certification category military open, and then progress its certification status along with the maturity of the design and of the Company).

The following table summarizes all possible combinations by taking into account the compatibility between the RPAS original flight envelope and the one required in the CONOPS/ORS.

It is fundamental to highlight that the actual achievability of any of the mentioned military certification categories, especially in the cases when the parent civil authorization cannot be exactly mirrored into the military context, strongly relies on the available evidence, the additional evaluation performed by the DAAA, the support of the Company and the consultation with the other stakeholders participating to the kickoff meeting.

Likewise, any achieved certification category is not static, and can incrementally progress towards a higher level of maturity, up to the full MTC, as further explained in paragraph 2.9.

Original flight authorization	**Acceptability of the original envelope wrt CONOPS/ORS**	**Corresponding military certification category**	**Notes**
Civil open	Yes	Military open	MTOW < 25 Kg. Original envelope defined by civil flight categories A1-A3. Applicable also for those Systems introduced in the market before the EASA norms for open RPASs.
	No	Military specific	MTOW < 25 Kg. Original envelope defined by the civil flight categories A1-A3. Applicable also for those Systems introduced in the market before the EASA norms for open RPASs.
Civil specific	Yes	Military specific	Original envelope defined in the SORA.
	No	Military specific	Original envelope defined in the SORA.
Civil certified	Yes	Military certified	Original envelope defined in the civil Technical Data Sheet accompanying the civil Type Certificate.
	No	Military specific Military certified	Original envelope defined in the civil Technical Data Sheet accompanying the civil Type Certificate This case also applies when the civil certification does not fit the military requirements in terms of airworthiness.
Military open	Yes	Military open	Original flight envelope defined as a subset of flight categories A1-A3.
	No	Military specific	Original flight envelope defined as a subset of flight categories A1-A3.
Military specific	Yes	Military specific	Original envelope defined in the original clearance.
	No	Military specific	Original envelope defined in the original clearance.

Original flight authorization	Acceptability of the original envelope wrt CONOPS/ORS	Corresponding military certification category	Notes
Military certified	Yes	Military certified	Original envelope defined in the Technical Data Sheet.
	No	Military specific Military certified	Original envelope defined in the Technical Data Sheet.
Military design with no previous military authorizations	N/A[4]	Military open Military specific Military certified	The certification product will always have to stick with the CONOPS/ORS. It can progressively achieve any of certification categories The case is also applicable to civil design with military fittings; credit will be taken from the civil baseline, if available.

Table 1: RPAS military certification category allocation

For each of the 3 RPAS military certification category, a summary chart, with additional information and steering, is reported in Attachments A, B and C.

2.4. DEMANDS ON THE COMPANY

In accordance with the basic principles of this process at paragraph 2.1, any scrutiny on the Company already performed by the civil Authorities will be endorsed and further expanded, if feasible and compatible with the level of certification ambition defined in the CONOPS/ORS (or discussed at the kickoff meeting).

The following table presents the different demands on the Company, depending on the RPAS military certification category.

RPAS military certification category	Demands on the Company	Notes
Military open	Endorsement, without further investigations, of the EU screening performed onto the Companies designing, importing and distributing the System, in accordance with the norms at reference [2] and [3].	No SDR assigned to the Company [5]

[4] It is implicit that the RPAS is expected to progressively match the requirements set in the CONOPS/ORS.

[5] More specifically, the RPAS user will have to seek the Company support in terms of continued and continuing airworthiness, technical pubblication preparation, update and distribution, spare parts provision, repairs, configuration control, etc. These items will not be managed by the DAAA. Nevertheless, the DAAA will have to be informed of any configuration change (hardware or software) or any envelope or performance variation of the

RPAS military certification category	Demands on the Company	Notes
Military specific	Any of following: • Endorsement, without further investigations, of the EU screening performed onto the Companies designing, importing and distributing the System, in accordance with the norms at reference [2] and [3]. • In case of SORA availability, endorsement, without further investigations, of the EU screening performed in accordance with the norms at reference [3] and [9], in terms of UAS Company obligations and organizational OSOs. • In case of O-MPtF, request to the UAS Company of applying as SDR	In case of O-MPtF, the Company shall be appointed SDR and will have to fulfil part of the obligations toward the DAAA, as per AEP(EP).00-00-5, in terms of: • application for O-MPtF • holdership of the RPAS design or of appropriate technical and commercial agreements with the organization designing the System • product configuration control • technical problems reporting. Therefore, the continued and continuing airworthiness will not be managed by the DAAA, but through a direct agreement between the Company and the User[6]. The route to bestow the SDR is required when issuing an O-MPtF, whereas it is not strictly necessary in the other cases, unless there is a plan to evolve the System into an MTC.

System and any technical problem, so the establish the validity of the technical analyses supporting the flight authorization. This activity will be discharged for the Military Open class by the RPAS user.

[6] More specifically, the RPAS user will have to seek the Company support in terms of continued and continuing airworthiness, technical pubblication preparation, update and distribution, spare parts provision, repairs, configuration control, etc. These items will not be managed by the DAAA. Nevertheless, the DAAA will have to be informed of any configuration change (hardware or software) or any envelope or performance variation of the System and any technical problem, so the establish the validity of the technical analyses supporting the flight authorization. This activity will be discharged by the Company in the case of O-MPtF, and by the RPAS user in the other case.

RPAS military certification category	Demands on the Company	Notes
Military certified	Any of following: • Request to the Company of fulfilling the requirements for an SDR. • Request to the Company of fulfilling the requirements for an MDOA.	In the context of the certification category military certified, the Company subject to the scrutiny for the appointment as SDR or MDOA is normally the Company designing the System, but it can also be the one importing or distributing it, as long as the requirements expressed in the AEP(EP).00-00-5 or AER(EP).P-21 are satisfied.

Table 2: Company demands for each RPAS military certification category

2.5. CERTIFICATION BASIS

In accordance with the basic principles of this process at para 2.1, the Certification Basis established for each of the RPAS certification category depends on the expected level of maturity the System, the certification aspirations defined in the CONOPS/ORS and/or discussed at the kickoff meeting.

The following table presents the different options. In this context, it is worth reminding that the information provided in the table represent a guideline for the configuration of a final Certification Basis, which normally includes tailored requirements and waivers, as explained in the norms AER(EP).P-2 and AER(EP).P-21.

RPAS military certification category	Certification Basis	Notes
Military open	None (no flight certification achieved for this certification category)	If feasible, the Company will be asked to compile the RPAS checklist/IAC, otherwise, the DAAA will try to fill the checklist with any available information

RPAS military certification category	Certification Basis	Notes
Military specific	None (no flight certification is achieved).	The Company will be required to fill any of the following, depending on the RPAS MTOW: RPAS checklist / IAC (micro/mini) STANAG 4671 (tactical, strategic fixed wing) STANAG 4702 (tactical, strategic rotary wing) STANAG 4703 (mini, light fixed wing) STANAG 4746 (mini, light rotary wing) These tables will be used by the DAAA to conduct the relevant technical analyses in order to produce a technical clearance or a safety case.. In the case of total lack of information and interfaces with the Company, the RPAS will receive only a technical clearance (no O-MPtF) and it will be DAAA duty to compile at least the RPAS checklist/IAC (any MTOW).
Military certified	RPAS checklist / IAC STANAG 4671 STANAG 4702 STANAG 4703 STANAG 4746	

Table 3: Certification Basis for each RPAS military certification category

2.6. DAAA ANALYSES

In accordance with the basic principles of this process as per paragraph 2.1, for each RPAS military certification category, the DAAA will perform a number of technical and safety analyses, by also taking credit from the information and the evidence inherited from the civil world, when available.

The following table presents the different options.

RPAS military certification category	**DAAA analyses**	**Notes**
Military open	Analysis of the RPAS checklist/IAC responses redacted by the Company. Compilation of the RPAS checklist/IAC, if necessary. Analysis of the Company credentials. Analysis of the EU Notifying Body assessment. Analysis of the RPAS service history and occurrences record (if available). Calculation of a ground and air safety area. Preparation of a Technical Assessment (TA)[7] with the outcomes of the above analyses.	In Attachment D more details on the TA format and types of information to include. The air safety area is normally superfluous, as the military open RPASs will fly in a segregated airspace and with strong restrictions in terms of altitude (below 120 mt).

[7] The Technical Assessment represents a technical evaluation of the system safety and airworthiness features of the RPAS under scrutiny. Tightly coupled with the flight mission and the specific scenario defined in the CONOPS/ORS, it generates a set of recommendations and limitations with the scope of containing and mitigating the relevant residual risk. Intrinsically qualitative. See attachment D for more details.

RPAS military certification category	DAAA analyses	Notes
Military specific	Analysis of the information contained in the filled tables as per previous paragraph. Analysis of the relevant supporting evidence. Analysis of the SORA. Analysis of the UAS Company credentials. Determination of a ground and air safety area. (If feasible) Determination of the maximum population density, unique or fragmented, depending on the availability of a Probability of Cumulative Catastrophic effects (P_Cum_Cat) and a Fault Tree Analysis (FTA). Determination of the Qualitative Level of Population Density (QLPDs). Preparation of a Safety Case (SC)[8]	In Attachment E more details on the SC format and types of information to include. In section 2.7 more information on the computation of the population density and the QLPDs. A TA can also be produced as alternative to the SC, in case of insufficient supporting evidence; however this deliverable will not be deemed adequate to release an O-MPtF.
Military certified	Analysis of the information contained in the agreed Certification Basis and of the relevant supporting evidence. Analysis of the Company credentials. (If necessary and required) Determination of the QLPDs. Preparation of an CTR/TDS.	

Table 4: DAAA analyses for each RPAS military certification category

2.7. POPULATION DENSITY CALCULATION

The calculation of the maximum population density constitutes an additional form of mitigation against the risks posed by an RPAS deficient design, mostly related to the failure of the P_Cum_Cat to comply with the quantitative requirements captured in the applicable Certification Basis.

[8] It represents a technical evaluation of the system safety and airworthiness features of the RPAS under scrutiny. Tightly coupled with the flight mission and the specific scenario defined in the CONOPS/ORS, it generates a set of recommendations and limitations with the scope of containing and mitigating the relevant residual risk. With respect to the TA, the SC also contains an evaluation of the technical elements and of the Operational Safety Objectives (OSO) captured in the SORA, if available and runs a safety analysis with the estimation of the maximum density of overflown population. More details about the SC format are included in Attachment E.

In the context of this TP:

- a numerical value of the maximum density for overflown population (DPmax) will be determined by applying different equations and by taking into account the P_Cum_Cat, the RPAS size and velocity, the shelter factor, the possible presence of dangerous materials;
- depending on the availability of an FTA, which permits to segment the value of the P_Cum_Cat across the RPAS different phases of flight, it will also be possible to accordingly determine different DPmax;
- the DPmax values will then be translated into a set of qualitative attributes (QLPDs), so to facilitate the relevant application;
- the final DPmax (unique and/or segmented) and the QLPDs will be included in the SC or the CTR/TDS, as part of the clearance.

It is important to re-iterate that imposing a limitation to the overflown population might also be a mitigation applied in the cases where more qualitative requirements are not fulfilled, like for instance the achievement of an adequate assurance level for the software.

The following table shows the correspondence between DPmax and QLPD. The values utilize the guidelines suggested by EASA, and then evolve the actual numerical correspondence between DPmax and QLPD depending on the population distribution in the Italian territory.

DPmax (ppl/Km2)	QLPD
<1	Unpopulated
<25	Rural
<50	Sparsely populated
<250	Suburban
<400	Urban
<1000	Dense urban
<10000	Extremely dense urban
>10000	Assembly of people[9]

Table 5: **QLPD definition**

In Attachment F more details are provided about the process to follow.

2.8. CERTIFICATION PRODUCTS

The RPAS certification category allocation and the analyses carried by the DAAA will consent the release of different types of certification products, depending on the level of maturity, certification ambition defined in the CONOPS/ORS and/or discussed at the kickoff meeting.

[9] *10000 is the minimum number of people to qualify as assembly.*

The following table summarizes such products.

RPAS military certification category	RPAS certification products	Notes
Military open	Technical clearance	For the certification category military open, no DAAA flight certification will be released, only a “technical clearance”, through a TA, in support of the flight authorization operated by the MAA.
Military specific	O-MPtF Technical clearance	The O-MPtF and the Technical Clearance will be exploited by the MAA to issue a flight clearance. The O-MPtF will be issued in case of: • Company appointed as SDR • Tables defined in paragraph 2.5 comprehensively filled by the Company • System maturity adequate, with design shortfalls eligible to be compensated by a maximum population density and technical-operational restrictions • Availability of a safety analysis carried by the Company, including the calculation of a P_Cum_Cat • SC availability with a computation of both an air and a ground safety envelope and a maximum population density A Technical clearance will be released in the other cases.
Military certified	R-MTC Full MTC	The issue of an R-MTC will require a further step with the MAA, which will release an operational clearance based on the prescriptions contained in the inherent TDS.

Table 6: RPAS certification products for each RPAS military certification category

2.9. RESIDUAL RISK DETERMINATION AND ACCEPTANCE

In accordance with the Technical Procedure AER(EP).P-23, for each of the mentioned certification products, the relevant RRs will be recognized, discussed and presented to the kickoff meeting stakeholders.

With the assumption that each RPAS certification product will always aim at minimizing the residual risks, as the System design and the organizational features of the Company evolve towards the full certification, a progressive shift of the liability and ownership of the RRs towards the DAAA will be observed, as summarized in the following table:

RPAS military certification category	RR acceptance	Notes
Military open	DAAA/MAA	Based on the technical clearance encapsulated by the DAAA into a TA
Military specific	DAAA/MAA	Based on the technical clearance and/or the O-MPtF
Military certified	DAAA (MTC) DAAA/MAA (R-MTC)	As defined in the TDS and RT in support of the full MTC and R-MTC.

Table 7: RPAS certification products for each RPAS military certification category

2.10. TASK CLOSURE

As shown in figure 1, the RPAS user will be consulted at the end of the certification process, in order to establish and concur the level of adherence between the final authorized RPAS flight envelope and the one defined in the CONOPS/ORS (or agreed at the kickoff meeting).

Two possible outcomes result from this phase:

- the end product satisfies the RPAS user's requirements, therefore there is no need for further developments, and the task can be considered closed;
- the RPAS design will continue maturating, along with the applicable certification products, with a new iteration of the steps described at paragraphs 2.3-2.9.

In Attachment G a pictorial representation of the main concepts explained in the paragraphs 2.3-2.9 is also shown.

3. LEGACY PROGRAMMES

This TP will be applied to every new RPAS acquisition, procurement and certification programme.

For the legacy Systems already certified and introduced into service, in accordance with AER(EP).P-21 “changed product rules”, should major significant or substantial changes be implemented into the RPAS design, the DAAA will have the faculty to evaluate the possible applicability of this new TP, and consult the MAA and the RPAS User accordingly.

4. FOREIGN RPAS FLYING IN ITALY

In the special cases described in paragraph 1.3 for the Foreign RPAS employing Italian Air Space and facilities in a military context, no military RPAS certification categories will be assigned.

Nonetheless, the DAAA, after a consultation with the MAA and the originator of the requirement (Air Staff, Embassy, etc.), will be responsible to prepare a TA or a SC (depending on the availability of information) and provide this technical clearance to the MAA for the relevant flight authorization.

5. PERMIT TO FLY

In accordance with the norms AER(EP).P-7 and AER(EP).P-21, no PTF, Prototypical or Experimental marking is assigned to the RPASs under development and falling into the Micro and Mini weight category.

Nonetheless, the DAAA, after a consultation with the MAA, will be responsible to prepare a TA and provide this technical clearance to the MAA for the relevant flight authorization.

Attachment A

RPAS Military Open Summary Chart

Feature title	Description	Notes
MTOW	< 25 Kg	
Conditions triggering the certification category	Any of the following: - RPASs of civil derivation and carrying the EASA civil open marks C0-C4; - RPASs of civil derivation, introduced and distributed before the entry into force of the EASA norms for granting the civil open authorization, and therefore not carrying the civil open marks; - RPASs of military derivation (or military adaptation originated from a civil design) not belonging to the certification categories military specific or military certified.	The third subcase could be represented, for instance, by an RPAS of military design, whose maturity is not adequate to perform a complex profile, so to need the production of a SORA, and that can be flown within the boundaries of flight categories A1-A3; in this case, due to the lack of credit granted from a civil Notifying Body, the level of scrutiny allocated to the Company will be defined by the DAAA.
Initial airworthiness-Application owner	No formal application by a design Company. Process triggered by the RPAS user.	
Initial airworthiness - demands on the Company	Endorsement, without further investigations, of the EU screening performed onto the Companies designing, importing and distributing the System, in accordance with EASA norms for civil open class.	No SDR assigned to the Company [10]
Initial airworthiness - Certification Basis	None	If feasible, the Company will be asked to compile the RPAS checklist/IAC, otherwise, the DAAA will try to fill the blanks with any available information.

[10] More specifically, the RPAS user will have to seek the Company support in terms of continued and continuing airworthiness, technical pubblication preparation, update and distribution, spare parts provision, repairs, configuration control, etc. These items will not be managed by the DAAA. Nevertheless, the DAAA will have to be informed of any configuration change (hardware or software) or any envelope or performance variation of the System and any technical problem, so the establish the validity of the technical analyses supporting the flight authorization. This activity will be discharged by the RPAS user.

Feature title	Description	Notes
Initial airworthiness-supporting evidence	RPAS checklist/IAC, if feasible. Notifying Body report, if available. RPAS specification, users manual, technical data, occurrence reports, service history. Company credentials.	
Initial airworthiness - DAAA deliverables	Technical Assessment	Includes the outcomes of the analysis of the supporting evidence, and an estimation of the ground safety area.
Initial airworthiness - certification product	None	For the military open certification category, no DAAA flight certification will be released, only a “technical clearance”, through the preparation of a TA, in support of the flight authorization operated by the MAA.
RPAS registration	The RPAS belonging to this certification category will not be registered.	See AER(EP).P-7.
Pre-emptive limitations	Civil flight category A1-A3, depending on the MTOW.	
Continued airworthiness	No formal management through DAAA procedures.	Communication of any RPAS design changes, sw updates, etc. to the DAAA and MAA operated by the User. Update of the TA, if necessary.
Continuing airworthiness	No formal management through DAAA procedures.	Activity directly discharged by the RPAS user and the Company.
Acceptance documents	A Certificate of Conformity released by the Company for each individual System.	This Certificate of Conformity will show any potential deviation from the design of the System, which may affect the safety of flight.
Technical publications	No formal management through DAAA procedures.	Use of Company manuals without a formal endorsement by the DAAA.
Population density	None	Due to the lack, in normal circumstances, of P_Cum_Cat or an FTA.

Feature title	Description	Notes
Configuration management	No formal management through DAAA procedures or articulations.	The RPAS User will inform the DAAA in the case of any configuration change, which may invalidate the assumptions made for the release of the TA
System and Company overarching maturity	Low	
Time to complete the task for DAAA	Order of magnitude of days/weeks.	
Residual risk	Estimated medium/low, mitigation through significant restrictions on the maximum altitude, operating envelope, including the estimation of a ground safety area and the overfly of unpopulated areas.	
Residual risk acceptance	DAAA/MAA	Acceptance based on the DAAA technical clearance

Attachment B

RPAS Military Specific Summary Chart

Feature title	Description	Notes
MTOW	Any	
Conditions triggering the certification category	Any of the following: - RPASs belonging to the certification category military open, whose CONOPS/ORS demand an operational envelope trespassing the boundaries set by the flight categories A1-A3; - RPASs of civil derivation and classified EASA civil specific, independent whether the flight envelope defined in the applicable SORA is compatible with the CONOPS/ORS or must be expanded; - RPASs of civil and/or military derivation (also including military adaptations originated from a civil design), whose certification and airworthiness features and supporting evidence do not consent to achieve an MTC.	
Initial airworthiness-Application owner	See next feature (Initial airworthiness – demands on the Company), different possibilities apply.	

Feature title	Description	Notes
Initial airworthiness – demands on the Company	Any of the following: • Endorsement, without further investigations, of the EU screening performed onto the Companies designing, importing and distributing the System, in accordance with the norms at reference [2] and [3]. • In case of SORA availability, endorsement, without further investigations, of the EU screening performed in accordance with the norms at reference [3] and [9], in terms of UAS Company obligations and organizational OSOs. • In case of O-MPtF, application as SDR	In case of O-MPtF, the Company shall be appointed SDR and will have to fulfil part of the obligations toward the DAAA, as per AEP(EP).00-00-5, in terms of: • application for O-MPtF • holdership of the RPAS design or of appropriate technical and commercial agreements with the organization designing the System • product configuration control • presence of a Design Organization • technical problems reporting. Therefore, the continued and continuing airworthiness will not be managed by the DAAA, but through a direct agreement between the Company and the User[11]. The route to bestow the SDR is required when issuing an O-MPtF, whereas it is not strictly necessary in the other cases, unless there is a plan to evolve the System into an MTC.

[11] More specifically, the RPAS user will have to seek the Company support in terms of continued and continuing airworthiness, technical pubblication preparation, update and distribution, spare parts provision, repairs, configuration control, etc. These items will not be managed by the DAAA. Nevertheless, the DAAA will have to be informed of any configuration change (hardware or software) or any envelope or performance variation of the System or technical problem, so the establish the validity of the Safety Case supporting the flight authorization. In the case of the O-MPtF, this activity is discharged by the Company appointed SDR, in the other cases by the RPAS User.

Feature title	Description	Notes
Initial airworthiness - Certification Basis	None (no certification products)	The Company will be required to fill any of the following, depending on the RPAS MTOW: RPAS checklist / IAC (micro/mini) STANAG 4671 (light, tectical, strategic fixed wing) STANAG 4702 (mini rotary wing) STANAG 4703 (mini fixed wing) STANAG 4746 (light, tactical, strategic rotary wing) These tables will be used by the DAAA to conduct the relevant technical analyses in order to produce a technical clearance or a safety case.. In the case of total lack of information and interfaces with the Company, the RPAS will receive only a technical clearance (no O-MPtF) and it will be DAAA duty to compile at least the RPAS checklist/IAC (any MTOW)
Initial airworthiness-supporting evidence	• Tables filled as per previous point, and relevant supporting evidence. • SORA, if available. • UAS Company credentials. • Ground and air safety area. • (If necessary, feasible and required) Maximum population density, unique or fragmented, depending on the availability of a Probability of Cumulative Catastrophic effects and an Fault Tree Analysis. • QLPDs	A TA can also be produced as alternative to the SC, in case of insufficient supporting evidence; however this deliverable will not be deemed adequate to release an O-MPtF.
Initial airworthiness – DAAA deliverables	Any of the following: • Technical Assessment • Safety case	

Feature title	Description	Notes
Initial airworthiness - certification product	O-MPtF Technical clearance	The O-MPtF and the Technical Clearance will be exploited by the MAA to issue a flight clearance. The O-MPtF will be issued in case of: • Company appointed as SDR • Tables defined in paragraph 2.5 comprehensively filled by the Company • System maturity adequate, with design shortfalls eligible to be compensated by a maximum population density and technical-operational restrictions • Availability of a safety analysis carried by the Company, including the calculation of a P_Cum_Cat • SC availability with a computation of both an air and a ground safety envelope and a maximum population density A Technical clearance will be produced in the other cases.
RPAS registration	A dedicated section in the Register will be dedicated to those RPAS accompanied by an O-MPtF. For those not provided with such flight clearance, no traceability into the Register will be provided	See AER(EP).P-7.
Pre-emptive limitations	None	Will be defined in the DAAA deliverables. Population density limitation normally expected.

Feature title	Description	Notes
Continued airworthiness	No formal management through DAAA procedures.	Communication of any RPAS design changes, sw updates, etc. to the DAAA and MAA operated by the Company appointed SDR (in case of O-MPtF) or by the User (in case of a Technical Assessment). Update of the TA/SC, if necessary, accordingly.
Continuing airworthiness	No formal management through DAAA procedures.	Activity directly discharged by the RPAS user and the Company.
Acceptance documents	A Certificate of Conformity released by the Company for each individual System	The Certificate of Conformity will have to show that any deviation between the “as built” and the “as design” does not carry any significant impact in terms of airworthiness and flight safety.
Technical publications	No formal management through DAAA procedures.	Use of Company manuals without a formal endorsement by the DAAA.
Population density	(if necessary, feasible and required) Possibility of determining the numerical value of the maximum population density, segmented per flight phases. Allocation of QLPD	Pending availability of P_Cum_Cat and FTA.
Configuration management	No formal management through DAAA procedures or articulations.	The RPAS Company (in case of O-MPtF) and/or the RPAS User (in case of a technical clearance) will inform the DAAA in the case of any configuration change, which may invalidate the assumptions made for the release of the TA/SC/O-MPtF documents.
System and Company overarching maturity	Medium	
Time to complete the task for DAAA	Order of magnitude of weeks/months.	

Feature title	Description	Notes
Residual risk	Medium/low	For a specific category, a medium residual risk is expected with the issue of a sole TA, whereas a medium to low risk is normally expected after the release of an SC
Residual risk acceptance	DAAA/MAA	Acceptance based on the DAAA technical clearance and/or the O-MPtF

Attachment C

RPAS Military Certified Summary Chart

Feature title	Description	Notes
MTOW	Any	
Conditions triggering the certification category	All RPASs whose certification and airworthiness features, Company organizational performance and supporting evidence consent to achieve an MTC.	
Initial airworthiness-Application owner	Formal application in accordance with the obligations allocated to an SDR/MDOA.	
Initial airworthiness – demands on the Company	As per SDR/MDOA.	
Initial airworthiness - Certification Basis	RPAS checklist / IAC (micro/mini) STANAG 4671 (light, tectical, strategic fixed wing) STANAG 4702 (mini rotary wing) STANAG 4703 (mini fixed wing) STANAG 4746 (light, tactical, strategic rotary wing)	Selection of RPAS checklist/ IAC for mini depending on the availability of evidence and the maturity of the System design
Initial airworthiness-supporting evidence	Agreed Certification Basis, and relevant full supporting evidence (Means of Evidence). Company credentials. (If necessary and required) Maximum population density, unique or fragmented, depending on the availability of a Probability of Cumulative Catastrophic effects and an Fault Tree Analysis. QLPDs	
Initial airworthiness – DAAA deliverables	Technical Certification Report and Technical Data Sheet.	
Initial airworthiness - certification product	Military Type Certificate Restricted Military Type Certificate.	The issue of an R-MTC will require a further step with the MAA, which will release an operational clearance based on the prescriptions contained in the inherent TDS.
RPAS registration	The RPAS is registered in different ways, depending on the military weight category.	See AER(EP).P-7

Feature title	Description	Notes
Pre-emptive limitations	None	It is expected to apply limitations, especially in terms of population density, for R-MTCs.
Continued airworthiness	Application of pertinent DAAA procedures.	Activity discharged by the Company and DAAA iaw applicable procedures.
Continuing airworthiness	Application of pertinent DAAA procedure.	Activity discharged by the RPAS user/Company/DAAA iaw applicable procedures.
Acceptance documents	Certificate of Airworthiness as per AER(EP).P-7.	
Technical publications	Application through DAAA procedures.	Manuals approved by the DAAA iaw the applicable procedures.
Population density	Numerical value of the maximum population density and allocation of QLPD as mitigation for design / P_Cum_Cat shortfalls	
Configuration management	Management through DAAA procedures or articulations.	
System and Company overarching maturity	High	
Time to complete the task for DAAA	Order of magnitude of months/years.	
Residual risk	Estimated low, mitigation through restrictions and recommendations captured in the TDS and the technical publications.	
Residual risk acceptance	DAAA (MTC) DAAA/MAA (R-MTC)	For R-MTC, technical-operational mitigations applied by the MAA in terms of air space corridors, departure and landing procedures, etc.

Attachment D

Technical Assessment Format

MINISTERO DELLA DIFESA
DIREZIONE DEGLI ARMAMENTI AERONAUTICI E PER L'AERONAVIGABILITA'
VICE DIREZIONE TECNICA
1° UFFICIO

TECHNICAL ASSESSMENT

Subject: **<***title of the task***>**

1. Intro

<Present the Operational Requirement triggering the activity.

List the following general information:

- *the type of RPASs involved;*
- *the name of the respective Company;*
- *the area involved in the task;*
- *any specific and preemptive limitations defined for the activity, as extracted from the CONOPS;*
- *recognition of any information or evidence collected in the corresponding civil world;*
- *the outcomes of the Kickoff Meeting.>*

2. Analysis

2.1. System description

<Provide a brief description for each of the System, correlated by a pictorial representation, if possible.>

2.2. RPAS checklist/IAC outcomes

<For each of the listed RPASs, compile in this chapter or provide in attachment the RPAS checklist/IAC as defined in the norm AER(EP).P-516 Annex I, by also including any supporting evidence, if available, both on the System and on the Company.
If the System carries a civil marking, refer to any formal activity carried out by the EU nominated Notifying Body.
If the System is already provided with an MTC, refer to the relevant Technical Data Sheet.
The checklist is expected to be filled by the Company; however, for some cases, given the nature of the task, entries directly determined by the DAAA are also accepted.
Provide a qualitative evaluation of the maturity status of the System Design and of the Company.>

2.3. Air safety envelope

<For each of the listed RPASs, depending on the value of the MTOW, define the applicable flight envelope, by reflecting the same prescriptions as per civil flight categories A1-A3, in accordance with the following scheme:

- *For RPASs equivalent to a civil open class C0, apply A1 flight restrictions;*

- *For RPASs equivalent to a civil open class C1, apply A1 flight restrictions;*
- *For RPASs equivalent to a civil open class C2, apply A2 flight restrictions;*
- *For RPASs equivalent to a civil open class C3, apply A3 flight restrictions;*
- *For RPASs equivalent to a civil open class C4, apply A3 flight restrictions.*

Such restrictions will have be implemented to every point of the projection on the ground of the RPASs flight envelopes (see also next paragraph). [12]>

2.4. Ground safety envelope

<For each of the listed RPASs, calculate the corresponding ground envelope, as hereby described:

- *Determine the total energy at impact to the ground of the subject RPAS; such computation will have to be performed at different altitudes and airspeeds, up to the maximum values achievable by the RPAS (or authorized/concurred for the activity), and must take into consideration the maximum allowable wind;*
- *Confront the obtained results, converted in J, with the threshold value of 66 J[13];*
- *For those conditions above 66 J, determine the value of the ballistic/gliding fall of the System, in the hypothesis of a lost control triggering an uncontrolled flight into terrain; normally, a rotary wing System will be associated with a ballistic fall (a tumbling System can be imagined equivalent to the ballistic fall of a body), whereas a fixed wing is more likely to glide;*

  For a ballistic fall, as applicable to rotary wing RPASs, the following formula is suggested:

$$Buffer_{ballistic} = (wind + RPAS_{speed}) * time_{fall\_to\_the\_ground}$$

  For a gliding fall, as applicable to fixed wing RPASs, the following formula is suggested:

$$Buffer_{glide} = (time_{abort} * RPAS_{speed}) + (RPAS_{altitude} * wind)/RPAS_{sink}$$[14]

- *Apply a safety margin to the value calculated at the previous point, depending on the reliability of the information collected on the specific RPAS; as a guideline, if the RPAS is provided with an MTC and a TDS, then a sufficient level of*

[12] In the evaluation of the air envelope you may also consider the concept of "extended line of sight", i.e. the case where the RPAS is not in line of sight with the operator, but a "third observer", in close contact with the operator, may compensate the temporary lack of visual coverage of the RPAS by providing clear indications.
[13] The latest versions of the EU norms have raised this threshold from 66 J to 80 J, in order to establish a level of lethality. In the context of this DAAA norm, the more conservative value of 66 J is retained.
[14] This formula will be used when glide performance of the RPAS is not available. In that case, max glide performance will be considered

confidence can be assumed, over the RPAS behavior in case of emergency (no safety margin could be considered in this case); on the other hand, when the source of information used for the computation of such fall is not deemed sufficiently validated, a margin of 1.5 is suggested;

- *Confront this computed value with the minimum ground distance that must be maintained between the RPAS and any uninvolved person, as established in the flight categories A1-A3;*
- *Take the maximum value between the two and apply it to define the ground safety envelope.*

2.5. Safety envelope summary

<Merge the restrictions and limitations deriving from para 2.3 and 2.4 into a unique set of recommendations, by taking the most conservative positions, in case of overlapping.[15]>

2.6. Residual Risk estimation

< Evaluate the residual risk to carry the flight mission defined in the CONOPS/ORS, after the application of the recommendations and mitigations defined in the previous paragraphs.>

3. Conclusions

<Summary of the outcomes of the analysis, with the scope of providing an overarching technical clearance of the activity and the relevant residual risk, so to hand the task over to the MAA for the final authorization.>

THE HEAD OF THE AIRWORTHINESS OFFICE
OF THE TECHNICAL VICE-DIRECTORATE
(XXXXXXXXXXXXXXXXXXXXXXXX)

[15] It is important to observe that the subject RPAS may be utilized indoor, for a preliminary sweep of a building before the actual intervention of the manned teams. This typical operational scenario should be taken into account when setting the boundaries of technical clearance for the subject RPAS, especially in terms of GPS signal coverage and the presence of “involved” or “uninvolved” personnel.

Attachment E

Safety Case Format

MINISTERO DELLA DIFESA
DIREZIONE DEGLI ARMAMENTI AERONAUTICI E PER L'AERONAVIGABILITA'
VICE DIREZIONE TECNICA
1° UFFICIO

SAFETY CASE

Subject: **<***title of the task***>**

1. Intro

<Present the Operational Requirement triggering the activity.

List the following general information:

- *the type of RPASs involved;*
- *the name of the respective Company;*
- *the area involved in the task;*
- *any specific and preemptive limitations defined for the activity, as extracted from the CONOPS;*
- *recognition of any information or evidence collected in the corresponding civil world (i.e. SORA);*
- *the outcomes of the Kickoff Meeting.>*

2. Analysis

2.1. System description

<Provide a brief description for each of the System, correlated by a pictorial representation, if possible.>

2.2. RPAS Certification table

<For each of the listed RPASs, the Company is required to compile the table extracted by the applicable STANAGS/RPAS checklist/ IAC in accordance with the MTOW.
For each of the claims reported in the table, the Company shall provide the supporting evidence.
It will be DAAA's responsibility to identify, from this first set of analysis, the technical/operational risks associated with the employment of the System in the envelope defined in the CONOPS/ORS.>

2.3. SORA analysis

<If a SORA is available, report in this section the resulting SAIL, the recognized risks, the set of flight and ground envelope limitations and the related OSOs.
The applicability of the SORA outcomes to the required RPAS flight envelope as per CONOPS shall also be evaluated and here captured, so to estimate the impact of any area of operation not already covered in the SORA.
The existence of a SORA could be considered a valid alternative in the case of absence of a Certification Basis, as per previous paragraph. The decision about enforcing the requirement to compile a Certification Basis will be DAAA responsibility, by also taking

into consideration the CONOPS/ORS, the timeline and urgency associated to the task and the discussions at the kickoff meeting. A consultation with the MAA and RPAS user is also recommended.>

2.4. Safety analysis

For each of the technical/operational risks identified in the SORA and deemed not sufficiently mitigated, and for the risks derived from the Certification Basis analysis, a safety assessment shall be run by the Company.

The scope of this assessment is to identify the corresponding hazards/failure conditions, to estimate the relevant hazard risk index, as per MIL-STD-882 (in terms of severity and frequency), to determine the relevant mitigations (additional to those captured in the SORA) and to estimate the residual risk.

Take also into consideration the RPAS safety aspects as per Attachment F or this TP.>

2.5. Air safety envelope

<For each of the listed RPASs, define the applicable flight envelope, by reflecting the restrictions[16]:

- *imposed in the SORA;*
- *derived from the safety analysis.>*

2.6. Ground safety envelope

<For each of the listed RPASs, calculate the corresponding ground envelope, as hereby described:

- *Determine the total energy at impact to the ground of the subject RPAS; such computation will have to be performed at different altitudes and airspeeds, up to the maximum values achievable by the RPAS (or authorized/concurred for the activity), and must take into consideration the maximum allowable wind;*
- *Confront the obtained results, converted in J, with the threshold value of 66 J[17];*
- *Determine the value of the ballistic/gliding fall of the System, in the hypothesis of a lost control triggering an uncontrolled flight into terrain; normally, a rotary wing System will be associated with a ballistic fall (a tumbling System can be imagined*

[16] In the evaluation of the air envelope you may also consider the concept of "extended line of sight", i.e. the case where the RPAS is not in line of sight with the operator, but a "third observer", in close contact with the operator, may compensate the temporary lack of visual coverage of the RPAS by providing clear indications.

[17] The latest versions of the EU norms have raised this threshold from 66 J to 80 J, in order to establish a level of lethality. In the context of this DAAA norm, the more conservative value of 66 J is retained.

equivalent to the ballistic fall of a body), whereas a fixed wing is more likely to glide;

For a ballistic fall, as applicable to rotary wing RPASs, the following formula is suggested:

$$Buffer_{ballistic} = (wind + RPAS_{speed}) * time_{fall\_to\_the\_ground}$$

For a gliding fall, as applicable to fixed wing RPASs, the following formula is suggested:

$$Buffer_{glide} = (time_{abort} * RPAS_{speed}) + (RPAS_{altitude} * wind)/RPAS_{sink}$$ [18]

- *Apply a safety margin to the value calculated at the previous point, depending on the reliability of the information collected on the specific RPAS; as a guideline, if the RPAS is provided with an MTC and a TDS, then a sufficient level of confidence can be assumed, over the RPAS behavior in case of emergency (no safety margin could be considered in this case); on the other hand, when the source of information used for the computation of such fall is not deemed sufficiently validated, a margin of 1.5 is suggested;*
- *Compare such area with respect to the volume determined in the SORA, if available;*
- *Apply the most conservative area.>*

2.7. Airworthiness assessment

<Capture the results of the evaluation of the evidence provided by the Company against the concurred Certification Basis, as defined in the AER(EP).P-16.>

2.8. Population density

<In case a P_Cum_Cat is available and this value exceeds the acceptable threshold defined in the DAAA norms, determine the maximum density for overflown population, in terms of numerical values and discreet QLPD. This calculation may result in an unique value, or segmented through different flight phases.>

2.9. Safety envelope summary

<Merge the restrictions and limitations deriving from paras 2.3-2.8 into a unique set of recommendations, by taking the most conservative positions, in case of overlapping. [19]>

[18] This formula will be used when glide performance of the RPAS is not available. In that case, max glide performance will be considered

[19] It is important to observe that the subject RPAS may be utilized indoor, for a preliminary sweep of a building before the actual intervention of the manned teams. This typical operational scenario should be taken into account

2.10. Residual Risk estimation

< Evaluate the residual risk to carry the flight mission defined in the CONOPS/ORS, after the application of the recommendations and mitigations defined in the previous paragraphs.

If a safety analysis as per paragraph 2.4 has been carried out, then a residual hazard risk index can be assigned to each of the identified hazards/failure conditions.

Otherwise, the evaluation of the RR will be qualitative and driven by the contents of the SORA.>

3. Conclusions

<Summary of the outcomes of the analyses, with the scope of providing an overarching technical clearance of the activity, the DPmax and QLPD values and the residual risk, so to hand the task over to the MAA for the final authorization.>

THE HEAD OF THE AIRWORTHINESS OFFICE
OF THE TECHNICAL VICE-DIRECTORATE
(XXXXXXXXXXXXXXXXXXXXXXXX)

when setting the boundaries of technical clearance for the subject RPAS, especially in terms of GPS signal coverage and the presence of “involved” or “uninvolved” personnel.

Attachment F

RPAS Additional Safety Aspects

1. Intro

This Attachment provides a number of guidelines concerning the RPAS mid-air collision safety measures and the calculation of the population density for RPASs not meeting the cumulative probability of catastrophic event requirement.

2. MID-AIR collision

The probability of collision of an RPAS with other aircraft is directly linked with the technical problems of "See & Avoid" and "Sense & Avoid", flight rules (VFR/IFR), operative restrictions, choice of operating areas and communication procedures with Air traffic control (ATC). Installation on the RPA of the following minimum equipment/system set reduces the risk of mid-air collision:

- navigation and anti-collision lights (24 hours a day);
- "Earth/Board/Earth" Communication System for communication between the remote pilot and ATC;
- direct link (for example via telephone) between the Ground Control Station and ATC, for communications in case of Communication System failure;
- IFF Transponder (with the possibility of switching the transponder on and off from the Ground Control Station, or manually select the codes and respond to a "squawk ident" request by ATC).

The need to adapt and install systems such as:

- Traffic Collision Avoidance System (TCAS),
- Low Altitude Alerting System,
- Ground Proximity Warning System (GPWS),
- Terrain Awareness and Warning System (TAWS),
- Automatic Dependent Surveillance - Broadcast (ADS-B),
- Flight Alarm (FLARM)[20],

on the RPAS must also be assessed.

For RPA belonging to the weight category Mini and Micro, the probability of mid-air collision with other aircraft is directly linked with the limitations to airspace volumes. For these categories of RPAS, appropriate operating limits must be established which prevent interference with the airspace volumes used by air traffic: maximum altitude, maximum distance from operator, minimum distance from airport zones, maximum airspeed, etc. Lastly, it is stressed the need to find solutions for mitigating the risk of collision with aircraft not under ATC control or that do not carry transponders ("Non-cooperative Aircraft"), including gliders, hang-gliders, hot air balloons and parachutists that are not reliably identifiable by radar (for normally piloted aircraft this risk is reduced by applying visual flight

[20] FLARM is the traffic awareness and collision avoidance technology for General Aviation, light aircraft and UAV.

rules (VFR) and the capacity to “See & Avoid” of the pilot aboard the aircraft). In the absence of special types of radar or other optical sensors that demonstrate sufficient mitigation of the risk of collision with ‘non-cooperative’ airspace users, it is recommended applying constant visual surveillance or operating in presence of NOTAM for the segregation of the working area. In particular, for Mini and Micro RPASs it is recommended in any case operating in permanent visual contact with an observer, who may be the remote pilot or other military personnel in continuous contact with the remote pilot. For night operations, it may be reasonably assumed that “Non-cooperative Aircraft” do not constitute a risk and therefore mitigate a number of the above considerations.

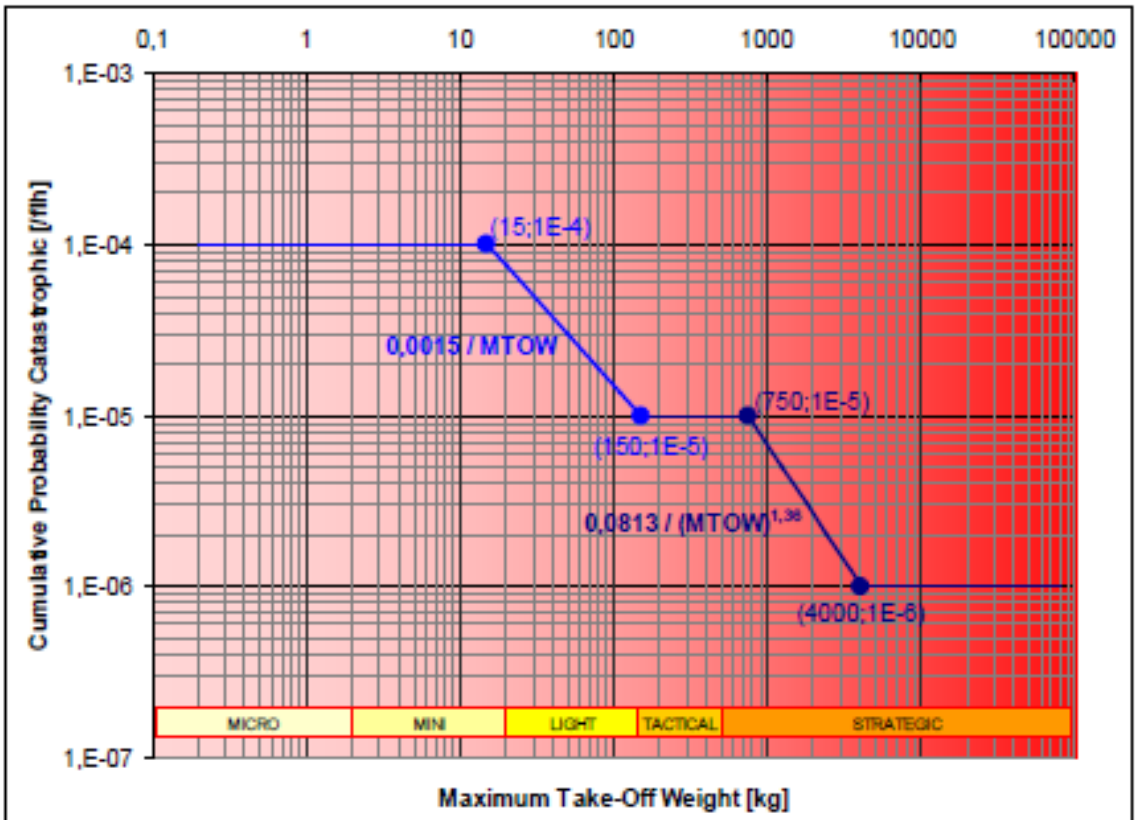
3. Third party overfly safety

3.1. P_Cum_Cat requirements with no population density restrictions

Considering that there is no crew aboard, in accordance with the norm AER(EP).P-6, the following have been defined as catastrophic events for RPASs:

- failure condition expected to lead to uncontrolled flight (including flight outside the planned areas and/or flight envelope) and/or uncontrolled crash;
- failure conditions that may lead to death of crew or ground staff.

The cumulative probability of catastrophic event (P_Cum_Cat) per flight hour to be achieved in order to operate the RPAS without population density restrictions must comply with the curve below:



If an RPAS does not meet the cumulative probability of catastrophic event established above, the DAAA will impose a restriction on the mean population density of the overflight areas.

It is important to highlight that population density restrictions will also be imposed in the case of the RPAS not complying with other, more qualitative, requirements. For instance, should the RPAS software not reach an adequate assurance level (attribute, by nature, qualitative), then it is likely that a limitation on the overflown population is imposed, flatly, across the entire flight mission.

Therefore, the steps described in the following paragraphs are to be followed exclusively in the cases of risk matrix and P_Cum_cat shortfalls.

3.2. Population density estimation - general

The following guidelines provide the estimation of the mean population density, in order to calculate a fixed level of cumulative probability of impact with overflown third parties in the case of "uncontrolled flight and/or uncontrolled crash".

This method is derived from Advisory Circular FAA AC-431.35-1 and permits calculation of the admissible mean population density, further enhanced with some elements taken from the SORA and MUSRA methodologies developed by EASA and EDA.

There are at least three scenarios (reduced to two when for technical feasibility the RPA is not equipped with back-up parachute, use of which reduces the kinetic energy of impact and debris dispersal area to apply in calculating the permitted population density of the overflown areas):

1. in the non-terminal phases of flight, loss of control of the RPA with activation of back-up system (almost vertical descent with low kinetic energy at impact);
2. in the non-terminal phases of flight, loss of control of the RPA at high speed with back-up system failure (descent with high energy impact);
3. in the terminal phases of flight, loss of control of the RPA at low speed (descent from low altitude, hence without activation of back-up system, with average kinetic energy impact)[21].

The cumulative probability of impacting persons on the ground in case of catastrophic failure as per the above graph, is established are follows:

[21] This scenario is not considered catastrophic only if referred to unpopulated areas in the take-off/landing phases, the climb phase above the altitude activating the parachute and the approach phase below such activating altitude.

RPAS MTOW [kg]	Cumulative probability of impacting overflown persons /fh [PCUM-DEATH]
MTOW < 15 kg	≤ $1x10^{-4}$
15 kg ≤ MTOW < 150 kg	≤ 0.0015 / (MTOW)
150 kg ≤ MTOW < 750 kg	≤ $1x10^{-5}$
750 kg ≤ MTOW < 4000 kg	≤ $0.0813 / (MTOW)^{1.36}$
MTOW ≥ 4000 kg	≤$1x10^{-6}$

3.3. Population density estimation – numerical computation as per Advisory Circular FAA AC-431.35-1

The mean population density (DP) is calculated using the following formula:

$$DP = \frac{P_{CUM-CAT}}{P_{scenario-1} \times A_1 + P_{scenario-2} \times A_2 + P_{scenario-3} \times A_3}$$

where A1, A2 and A3 are the areas calculated on the basis of a geometrical area (a function of the dimensions of the Air Vehicle and the angle of descent) and an appropriate multiplication factor (a function of the total energy of the Air Vehicle).

The probability of the various scenarios is calculated as follows:

$$P_{scenario-1} = P_{RPAS\ loss} x \left(1 - P_{recovery\ system\ failure}\right)\ x\ \left(1 - T_{\%Exposure\ Time\ flight\ terminal\ phases}\right)$$

$$P_{scenario-2} = P_{RPAS\ loss} x \left(P_{recovery\ system\ failure}\right)\ x\ \left(1 - T_{\%Exposure\ Time\ flight\ terminal\ phases}\right)$$

$$P_{scenario-3} = P_{RPAS\ loss}\ x\ \left(T_{\%Exposure\ Time\ flight\ terminal\ phases}\right)$$

In the absence of other consolidated methods, the debris dispersal area after impact may be calculated as follows[22]:

$$A_1 = A_{geometric-1} x\ K_1$$

$$K_1 = MAX\left(1.1; MIN(7; 1.4 x E_{tot-1}^{0.2})\right)\ ,$$

$$where\ E_{tot-1}[kJ] = {}^1/_2\, xMTOWx\left(V_{z-chute}^2 + (0.40 x V_{x-wind})^2\right), assuming\ horizontal\ wind$$

$$A_2 = A_{geometric-2} x\ K_2$$

[22] Calculation of these areas can be adjusted based on direct experience of impacts with similar energy levels

$$K_2 = MAX\left(1.1; MIN(7; 1.4xE_{tot-2}^{0.2})\right) \ ,$$

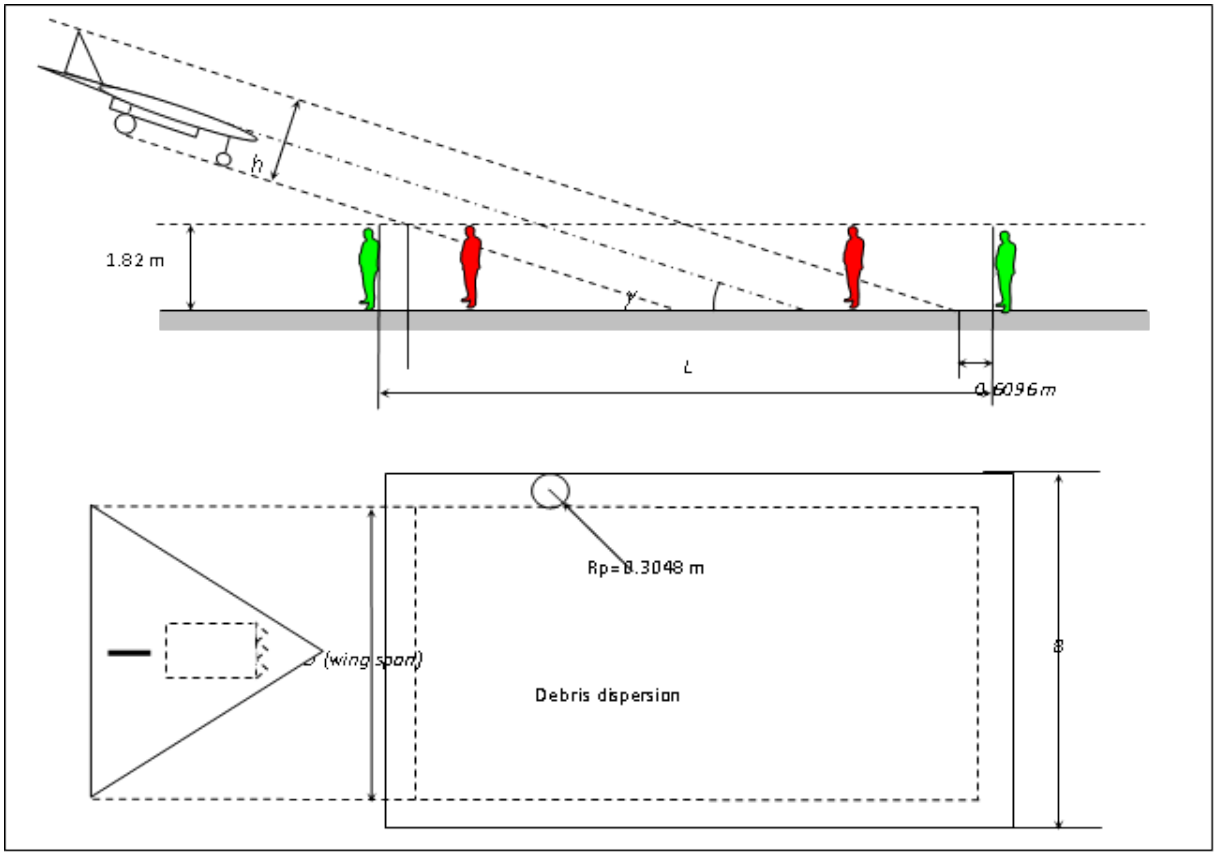
$$where\ E_{tot-2}[kJ] = {}^{1}/_{2}\, xMTOWx\left(V_{dive}^2 + 0.90x\left(MTOWx9.81xh_{max-operative}\right)\ \right)$$

$$A_3 = A_{geometric-3}x\, K_3$$

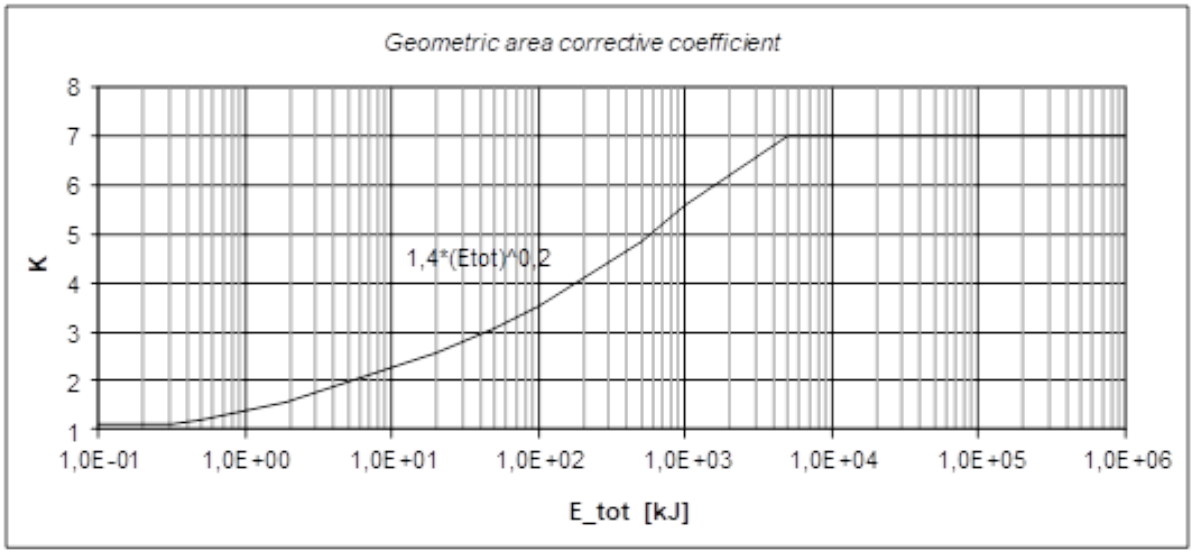
$$K_3 = MAX\left(1.1; MIN(7; 1.4xE_{tot-3}^{0.2})\right) \ ,$$

$$where\ E_{tot-3}[kJ] = {}^{1}/_{2}\, xMTOWx(1.3xV_{stall})^2 \ + 0.95x(MTOWx9.81xh_{max-appraoch})$$

The geometric area can be calculated, drawing on the information given in FAA Advisory Circular AC-431.35-1, as illustrated in the figure that follows.



Lastly, the figure below offers a curve for selecting the geometric area correction factor, according to total system energy expressed in [kJ]. In the absence of consolidated criteria, to be agreed with the AAD, it is recommended to use this formula.



3.4. Population density estimation – numerical corrections as per MUSRA methodology

In accordance with the Military UAS Specific Risk Assessment (MUSRA) methodology, the DP value here obtained is further implemented, by taking into account the following contributing/mitigating factors:

- dispersion areas due to the carriage of dangerous loads;
- shelter factor.

To take into account the first variable, for each of the three Areas defined above (A_1, A_2, A_3), the following rationale will be applied:

$$A_{1,2,3\_cor\_explos} = MAX(A_{1,2,3};\ A_{dangerous})$$

$$A_{dangerous} = 1.263x10^{6}xAUW^{1/3}$$

Where the All Up Weight (AUW) is the total weight of the munition, or munitions, including packaging and palletization.

For what regards the shelter factor, the following formulas will be applied.

$$DP_{corr\_shelter} = DP/(1\text{-}S)$$

Where:

$$S = (factor_1 x factor_2)x1.5$$

$$factor_1 = \text{-MTOW}x10^{-4}+0.4526$$

$$factor_2 = Mobility_{rate}xExposure$$

The protection factor$_1$ is given by the ability of a certain RPAS to penetrate a building when it hits its structure and strictly depends on its MTOW.

$Factor_2$ represents the percentage of the population that is protected inside buildings during the RPAS flight. This factor is computed as the combination of the Mobility rate of the population which is the percentage of inhabitants that leave their houses during the day on a daily basis and the exposure rate which is related to the amount of time people spend outside when they are not at home. For example, from a study carried out in Portugal the mobility rate is estimated to be on average 80%, which means that daily, 20% of the population remains sheltered in their houses. The exposure time is estimated to be 70 minutes during a working day. However, these 70 minutes are not evenly spread over the duration of the day with most of them being concentrated between 07:00 am and 01:00 am. By combining this data, Portugal estimated that the percentage of the population that is protected between 07:00 am and 01:00 am on a typical working day is around 95%.

The $DP_{corr\_shelter}$ represents the maximum value of the density population, that can be overflown for an RPAS with a given P_Cum_Cat.

For what above, and in relation to paragraph 2.7 of the main body of this TP, the following equation applies:

$$DPmax = DP_{corr\_shelter}$$

3.5. Population density estimation – qualitative discreet levels

Once determined the value of DPmax, then the Qualitative Level of Population Density (QLPD) can also be determined, by using the following table[23]:

DPmax (ppl/Km2)	QLPD
<1	Unpopulated
<25	Rural
<50	Sparsely populated
<250	Suburban
<400	Urban
<1000	Dense urban
<10000	Extremely dense urban
>10000	Assembly of people

3.6. Cumulative probability of RPAS impact with overflown population density

As shown in the previous paragraph, for the RPASs that do not meet the cumulative probability of catastrophic event requirement defined in paragraph 3, the values of DPmax

[23] These values and gates are derived from a study carried by the DAAA for the Globalhawk AGS certification, where it was verified an average population density of 200 people per square Kilometre over the Italian territory, with peaks of densely urban areas like Milan or Naples above 1100 people.

and of the corresponding QLPDs are determined as a function of the overarching P_Cum_Cat.

These values can then be confronted with those extracted by projecting the RPAS flight mission over the national territory, and by utilizing the inherent population density and distribution based on latest ISTAT census data, as hereby shown:

$$QLPD \leq QLDP_{ISTAT}$$

This evaluation can be performed in a function of the P_Cum_Cat only, or, if a detailed Fault Tree Analysis (FTA) is available, also by fragmenting the mission into a number of flight phases, each of which assigned with an exposure time (percent of mission time in phase), a numerical value of DPmax applicable for that phase and a QLPD[24].

An example is shown in the following table:

Mission phase	**Scenario**	**Exposure Time** $\sum_i T_{\%i} = 1$	**P_Cum_Cat:** **P_{TOL} (during TO and L)** **P_{CFOFA} (during C,-F1,-O,-F2-A)** **P_{FTS} (lost of the Flight Termination System)**	**Dispersion area** **A_{TOL} (TO & L)** **A^{LE} (Low Energy)** **A^{ME} (Medium Energy)** **A^{HE} (High Energy)**	**DPmax**	**QLPD**
Take Off (TO)	S_{TOL}	$T_{\%TO}$	P_{TOL}	A_{TOL}	DP_{TO}	$QLPD_{TO}$
Climb (C)	S_3	$T_{\%C}$	P_{CFOFA}	A^{ME}	DP_C	$QLPD_C$
Ferry to the operative area (F1)	S_1	$T_{\%F1}$	$P_{CFOFA} * (1-P_{FTS})$	A^{LE}	DP_{F1}	$QLPD_{F1}$
	S_2		$P_{CFOFA} * P_{FTS}$	A^{HE}		$QLPD_{F1}$
Operative area (O)	S_1	$T_{\%O}$	$P_{CFOFA} * (1-P_{FTS})$	A^{LE}	DP_O	$QLPD_O$
	S_2		$P_{CFOFA} * P_{FTS}$	A^{HE}		$QLPD_O$
Ferry from the Operative area (F2)	S_1	$T_{\%F2}$	$P_{CFOFA} * (1-P_{FTS})$	A^{LE}	DP_{F2}	$QLPD_{F2}$
	S_2		$P_{CFOFA} * P_{FTS}$	A^{HE}		$QLPD_{F2}$
Approach (A)	S_3	$T_{\%A}$	P_{CFOFA}	A^{ME}	DP_A	$QLPD_A$
Landing (L)	S_{TOL}	$T_{\%L}$	P_{TOL}	A_{TOL}	DP_L	$QLPD_L$

Based on this data, the rationale for the positive acceptance of a flight mission is hereby indicated:

$$QLDP_{phase\_of\_flight} \leq QLDP_{ISTAT\_phase\_of\_flight}$$

[24] The availability of an FTA is fundamental to establish the failure conditions pertaining each specific phase and to calculate the relevant cumulative probability of catastrophic event

Attachment G

RPAS Certification Options Overview

Origin	Certification Category	Conditions	DAAA Deliverables	Notes
Civil	**Military OPEN**	MTOW < 25 kg Compliant with Civil Open requirements DRS optional TA AW Checklist (possibly) Gov-Insured operator	Technical clearance	Flight authorization by MAA Limitations similar to Civil Open
Military	**Military SPECIFIC**	DRS / MDOA / UAS Company (only MTOW < 25 kg) SORA / SC /TA Certification Basis – RPAS AW Checklist (only MTOW < 25 kg) or STANAG (4671, 4702, 4703, 4746)	O-MPtF Technical clearance	Partially mature design Limitations on scenario Flight authorization by MAA
Civil	**Military CERTIFIED**	DRS / MDOA Certification Basis STANAG (4671, 4702, 4703, 4746)	R-MTC MTC	Mature Design Possible limitations on scenario (R-MTC)

AW: AirWorthiness
MTC: Military Type Certificate
MTOW: Maximum Take-Off Weight
O-MPtF: Operational Military Permit to Fly
R-MTC: Restricted MTC
SC: Safety Case
SDR: System Design Responsible
SORA: Specific Operations Risk Assessment
TA: Technical Assessment