

# **UAS Certification**

## ***Robótica Aérea***

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# certification

## ➤ Certification - Definition

- Certification is the confirmation that an object, product, service, organization or person complies with certain requirements/characteristics.
- Regarding Aeronautical Industry, certification is the obtention of Legal recognition, through issuance of a certificate by an Aviation Authority, that an aircraft complies with the corresponding requirements.
- There are two important kind of certificates:
  - *Type Certificate*: states the compliance of a design. It is valid for all products that are produced in accordance to that type design

# certification

## ➤ Certification - Definition

- *Airworthiness Certificate*: states that a particular aircraft, under a type certificate, can be safely operated
- Aircraft Airworthiness means compliance with certification requirements to assure the minimum safety level for an aircraft:
  - When designed and built according to applicable requirements
  - When operated within its intended environment and within its quantified and declared limitations
  - Maintained in accordance with procedures approved by the Authority

# certification

## ➤ Certification – Definition

- Qualification is the demonstration that a specific aircraft/product complies with the requirements defined in the contractual specification
- That means that Certification and Qualification are different things. Regarding aircraft:
  - Certification ensures that an aircraft is “fit for flight”. This means that the appropriate airworthiness level has been demonstrated

# certification

## ➤ Certification – Definition

- Qualification ensures that an aircraft is “fit for purpose”. This means that the required capabilities of the aircraft have been demonstrated
- Obviously, to obtain the airworthiness certification of the aircraft is prior to qualification. Therefore, qualification process usually is started after the airworthiness certification is obtained.

# certification

## ➤ Airworthiness Authorities

- The International Civil Aviation Organization (ICAO), based in Montreal, was created in 1947 as an agreement from the Chicago Convention celebrated at the end of 1944.
- IACO is an United Nations agency composed by the 193 members of the UN except for Dominica, Liechtestein and Tuvalu. It works under the following strategic objectives:
  - Safety - Enhance global civil aviation safety
  - Security - Enhance global civil aviation security
  - Environmental Protection - Minimize the adverse effect of global civil aviation on the environment
  - Efficiency - Enhance the efficiency of aviation operations
  - Continuity - Maintain the continuity of aviation operations
  - Rule of Law - Strengthen law governing international civil aviation

# certification

## ➤ Airworthiness Authorities - ICAO

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- IACO is an United Nations agency composed by the 193 members of the UN except for Dominica, Liechtestein and Tuvalu. It works under the following strategic objectives:
  - *Safety*: Enhance global civil aviation safety
  - *Air Navigation Capacity and Efficiency*: Increase the capacity and improve the efficiency of the global civil aviation system

# certification

## ➤ Airworthiness Authorities - ICAO

- *Security and Facilitation:* Enhance global civil aviation security and facilitation
- *Economic Development of Air Transport:* Foster the development of a sound and economically-viable civil aviation system
- *Environmental Protection:* Minimize the adverse effect of global civil aviation on the environment



# certification

## ➤ Airworthiness Authorities - ICAO

- The States members follow the annexes including in the International Standards (see annexes 6 and 8):

Annex 1	Personnel Licensing
Annex 2	Rules of the Air
Annex 3	Meteorological Service for International Air Navigation
Annex 4	Aeronautical Charts
Annex 5	Units of Measurement to be Used in Air and Ground Operations
Annex 6	Operation of Aircraft
Annex 7	Aircraft Nationality and Registration Marks
Annex 8	Airworthiness of Aircraft
Annex 9	Facilitation
Annex 10	Aeronautical Telecommunications
Annex 11	Air Traffic Services
Annex 12	Search and Rescue
Annex 13	Aircraft Accident and Incident Investigation
Annex 14	Aerodromes
Annex 15	Aeronautical Information Services
Annex 16	Environmental Protection
Annex 17	Security: Safeguarding International Civil Aviation Against Acts of Unlawful Interference
Annex 18	The Safe Transport of Dangerous Goods by Air

# certification

## ➤ Airworthiness Authorities

- The most industrialized and advanced countries have developed different regulations/standard/specifications, in accordance with ICAO Standards (sometimes exceeding them or being more concrete), in which the different Certification Process are based.
- To do this, they created organisms within the administration to regulate the Civil Air Navigation in each country
- The countries that have no specific developed regulation usually recognize the regulations from developed countries and, therefore, accept products that are compliant with such regulations

# certification

## ➤ Airworthiness Authorities

- Europe: EASA
  - USA: FAA
  - Spain: AESA
  - France: DGAC
  - Germany: LBA
- 
- In general, FAA certification regulations and EASA certification specs are generally accepted by most countries
  - Bilateral agreements are the legal mechanisms to define and recognize the way of working in civil aviation matters including airworthiness topics

# certification

## ➤ Airworthiness Authorities - EASA

- The **European Aviation Safety Agency (EASA)** is an agency of the European Union (EU) with regulatory and executive tasks in the field of civilian aviation safety.
- Based in Cologne, Germany, the EASA was created on July 2002,<sup>1</sup> and it reached full functionality in 2008 (2003 for the airworthiness and environmental certification of all aeronautical products), taking over functions of the Joint Aviation Authorities (JAA)
- Therefore, EASA is the Authority for certification of products and civil aviation organizations in the European Union (EU)

# certification

## ➤ Airworthiness Authorities - EASA

- EASA tries to state Uniform rules and implementation in all EU Member States:
  - Avoiding “Additional National design Requirements”
  - Reducing competences of the civil airworthiness authorities of the state members
- In addition, EASA could provide the Design Organizations with the DOA (Design Organization Approval)

# certification

## ➤ Airworthiness Authorities – EASA

- Essential parts of regulation 748/2012, as detailed in Annex I (Part 21), are the following:
  - Airworthiness and Environmental **certification** of aircraft and related products, parts and appliances
  - This part is related to aircraft certification activities, such as Type Certificate emissions, Supplemental Type Certificate emissions, stating the Airworthiness Requirements (Certification Specifications (CS), etc

# certification

## ➤ Airworthiness Authorities – EASA

- Certification of Design Organizations (**DOA**)
  - This part is related to the different requirements that design organizations must comply with in order to be certified by EASA as DOA and their corresponding privileges and obligations
- Certification of Production Organizations (**POA**)
  - This part is related to the different requirements that production organizations must comply with in order to be certified by EASA as POA and their corresponding privileges and obligations

# certification

## ➤ Airworthiness Authorities – EASA Regulations

- **Part 21 Section A** regulates the requirements to obtain type certificates, supplemental type certificates airworthiness certificates, flight permits, design organization approvals, production, ETSOs, etc.
- It is structured into the following sub-parts:
  - A - General provisions
  - B - Type certificates and restricted type certificates
  - D - Changes to type certificates and restricted type certificates
  - E - Supplemental type certificates
  - F - Production without Production Organisation Approval



# certification

## ➤ Airworthiness Authorities – EASA Regulations

G - Production Organisation Approval

H - Airworthiness certificates

I - Noise certificates

J - Design Organisation Approval

K - Parts and Appliances

M - Repairs

O - European Technical Standard Order Authorisations

P - Permit to Fly

Q - Identification of Products, Parts and Appliances

# certification

## ➤ Airworthiness Authorities – EASA Regulations

- The **Certification Specifications (CS)** are the EASA Airworthiness codes (derived from the JARs ones (Joint Aviation Regulations of former JAA)).
  - CS-22 (Sailplanes and Powered Sailplanes)
  - CS-23 (Normal, Utility, Aerobatic and Commuter Aeroplanes)
  - **CS-25 (Large Aeroplanes)**
  - CS-27 (Small Rotorcraft)
  - CS-29 (Large Rotorcraft)
  - CS-31GB (Gas Balloons)
  - CS-31HB (Hot Air Balloons)
  - CS-34 (Aircraft Engine Emissions and Fuel Venting)
  - CS-36 (Aircraft Noise)
  - CS-APU (Auxiliary Power Units)
  - CS-AWO (All Weather Operations)

# certification



## ➤ Airworthiness Authorities – EASA Regulations

- CS-E (Engines)
- **CS-ETSO (European Technical Standard Orders)**
- CS-FSTD(A) Aeroplane Flight Simulation Training Devices
- CS-FSTD(H) Helicopter Flight Simulation Training Devices
- CS-Definitions (Definitions and Abbreviations)
- CS-LSA (Light Sport Aeroplanes)
- CS-P (Propellers)
- CS-VLA (Very Light Aeroplanes)
- CS-VLR (Very Light Rotorcraft)
- AMC-20 (General Acceptable Means of Compliance for Airworthiness of Products, Parts and Appliances)

# certification

## ➤ Airworthiness Authorities – EASA Regulations

- The book 1 of the CS includes the mandatory requirements. They are divided in different Sub-Parts. Each subpart, is divided in different paragraphs, that establish the corresponding requirements:
- *i.e Subpart C CS 25. 571*
  - *Subpart A. General.* Provides information about the type and category of the aircraft to which the standard is applicable.
  - *Subpart B. Flight.* Establish the requirements to cover Performances, Handling Qualities, etc
  - *Subpart C. Structures.* Establish the requirements regarding structural design, loads, etc

# certification

## ➤ Airworthiness Authorities – EASA Regulations

- *Subpart D.* Design and Construction. Establish the requirements regarding materials, designs techniques, etc
- *Subpart E.* Power Plant.
- *Subpart F.* Equipment. Establishes the requirement regarding the general systems and equipment
- *Subpart G.* Operating Limitations and Information
- ***Subpart H.* Electrical Wiring Interconnect Systems**
- *Subpart J.* APU

# certification

## ➤ Airworthiness Authorities – EASA Regulations

- The book 2 of the CS includes the AMC (Acceptable Means of Compliance) for each CS
- AMCs are acceptable means, but not the only means, to show compliance with the regulations
- However, using other ways of compliance is not the recommended process to be followed.
- The CS-25 AMCs are designed in accordance with the associated paragraph number
- The final part of book 2 includes general AMCs

# certification

## ➤ Airworthiness Authorities – EASA Regulations

- The European Technical Standard Order (ETSO) is a minimum performance standard for specified materials, parts, processes and appliances used on civil aircraft
- In the Europe and the United States, many aircraft components are manufactured to a common standard, known as a Technical Standard Order or TSO (an ETSO in the EU).
- TSOs are typically used for components that may be common to a number of different types. This can include components like avionics, seats, seat belts, and emergency equipment.

# certification

## ➤ Airworthiness Authorities – EASA Regulations

- The theory of a TSO is that a part that meets the minimum standards of a TSO ought to be able to function appropriately in aircraft that needs a component of that sort.
- A company that wants to produce parts that meet the minimum standards of a TSO must apply for government approval in order to do so



# certification

## ➤ Airworthiness Authorities – FAA

- The **Federal Aviation Administration (FAA)** of the United States, created in 1958, is a national authority with powers to regulate all aspects of civil aviation.
- These include the construction and operation of airports, air traffic management, the certification of personnel and aircraft, and the protection of U.S. assets during the launch or re-entry of commercial space vehicles.
- Product Certification activities are managed by the Aircraft Certification Safety AIR (ACS AIR)
- Aeronautics and Space are regulated in Title 14 of the Code of Federal Regulations, shortly referred as 14 CFR

# certification

## ➤ Airworthiness Authorities – FAA regulations

- There is a high level of commonality between technical requirements in EU and US. The following table shows a comparison between EASA and FAA for the main applicable requirements:

	<i>EASA</i>	<i>FAA</i>
▪ Implementing Rules		
	PART 21	FAR PART 21
▪ A/W Requirements		
<i>Small Aeroplane</i>	CS-23	FAR Part 23
<i>Large Aeroplane</i>	CS-25	FAR Part 25
<i>Engines</i>	CS-E	FAR 33
<i>Propellers</i>	CS-P	FAR 35
▪ Environmental protection Requirements		
<i>Emissions</i>	CS-34	FAR Part 34
<i>Noise</i>	CS-36	FAR Part 36
Operations		
<i>Operations</i>	CS-AWO	AC 120 – xxx

# certification

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# certification

## ➤ Airworthiness Authorities – AESA

- The Spanish Aviation Safety and Security Agency, also known by the acronym AESA (Spanish: Agencia Estatal de Seguridad Aérea), is the national aviation authority for Spain.
- The agency is based in Madrid.
- The agency was set up in 2008, taking over supervisory duties from the DGAC (*Dirección General de Aviación Civil*).
- One of its main tasks is the emission of Airworthiness Certificates and all the licenses and permits required to perform civil aviation activities in Spain
- Close collaboration with EASA

# certification

## ➤ Airworthiness Authorities – DGAC

- DGAC is the organ belonging to Ministerio de Fomento that designs the strategy and rules the aeronautics policy.
- DGAC coordinates the organisms with functions regarding civil aviation and is the regulator of the aerial sector in Spain.
- It manages the collaboration between the ministries of Fomento and Defence

# certification

## ➤ Airworthiness Authorities – Military Aviation

- The main differences in dealing with airworthiness between civil and military aviation is the fact that:
  - No general international conventions like the Chicago one exists in military aviation
  - The nations are fully responsible of the airworthiness of aircraft operating under their military register. This includes initial certification and continuous airworthiness
  - In most cases the certification and qualification aspects cannot be easily managed separately

# certification

## ➤ Airworthiness Authorities – Military Aviation

- As a consequence:
  - There are no uniform criteria for the certification processes
  - Only few countries have a relevant airworthiness frame
  - Only in multi-national projects, agreements are reached
  - Each project is managed individually
  - Individual tailoring of certification basis is the common practice

# certification

## ➤ Airworthiness Authorities – INTA/DGAM

- The Military Airworthiness in Spain is regulated by the “Reglamento de Aeronavegabilidad de la Defensa” (RAD)
- According to this rule, the Spanish Military Airworthiness Authority is DGAM (Dirección General de Armamento y Material)
- DGAM is responsible for:
  - Issuance of Type Certificates (after INTA Technical Certificate issuance)
  - Issuance of Airworthiness Certificates (except CAEs that are usually issued by INTA)

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# certification

## ➤ Airworthiness Authorities – INTA/DGAM

- Supervision on Continuous Airworthiness
- ANAC (Autoridad Nacional de Aseguramiento de la Calidad).
- Industrial Inspections performed through RAC (Representante de Aseguramiento oficial de la Calidad)
- INTA is an autonomous organism responsible for:
  - Issuance for Technical Certificates
  - Issuance of CAEs (Certificados de Aeronavegabilidad Experimental)

# certification

## ➤ Type Certificate – Definition

- The Type Certificate is the document that the Authority provides to the industry owner of the design with, stating that the Type Design complies with the applicable Airworthiness Requirements.
- The Type Design of an aeronautical product is defined according to EASA Part 21.
- It is important to clarify that the Type Certificate is not an Airworthiness Certificate for a particular aircraft MSN
- When developing a specific aircraft, any deviation from the Type Design is a Design Change that must be approved by the Authorities.



# certification

## ➤ Type Certificate – Changes

- Classification of Design Changes is performed in accordance with EASA Part 21 and applicable AMC-GM to Part 21
- **21.A.91 Classification of changes in type design**
  - *Changes in type design are classified as minor and major.*
    - *A ‘**minor change**’ is one that has no appreciable effect on mass, balance, structural strength, reliability, operational characteristics, noise, fuel venting, exhaust emission, or other characteristics affecting the airworthiness of the product.*
    - *All other changes are ‘**major changes**’*
  - *Major and minor changes shall be approved in accordance with 21.A.95 or 21.A.97 as appropriate, and shall be adequately identified.*



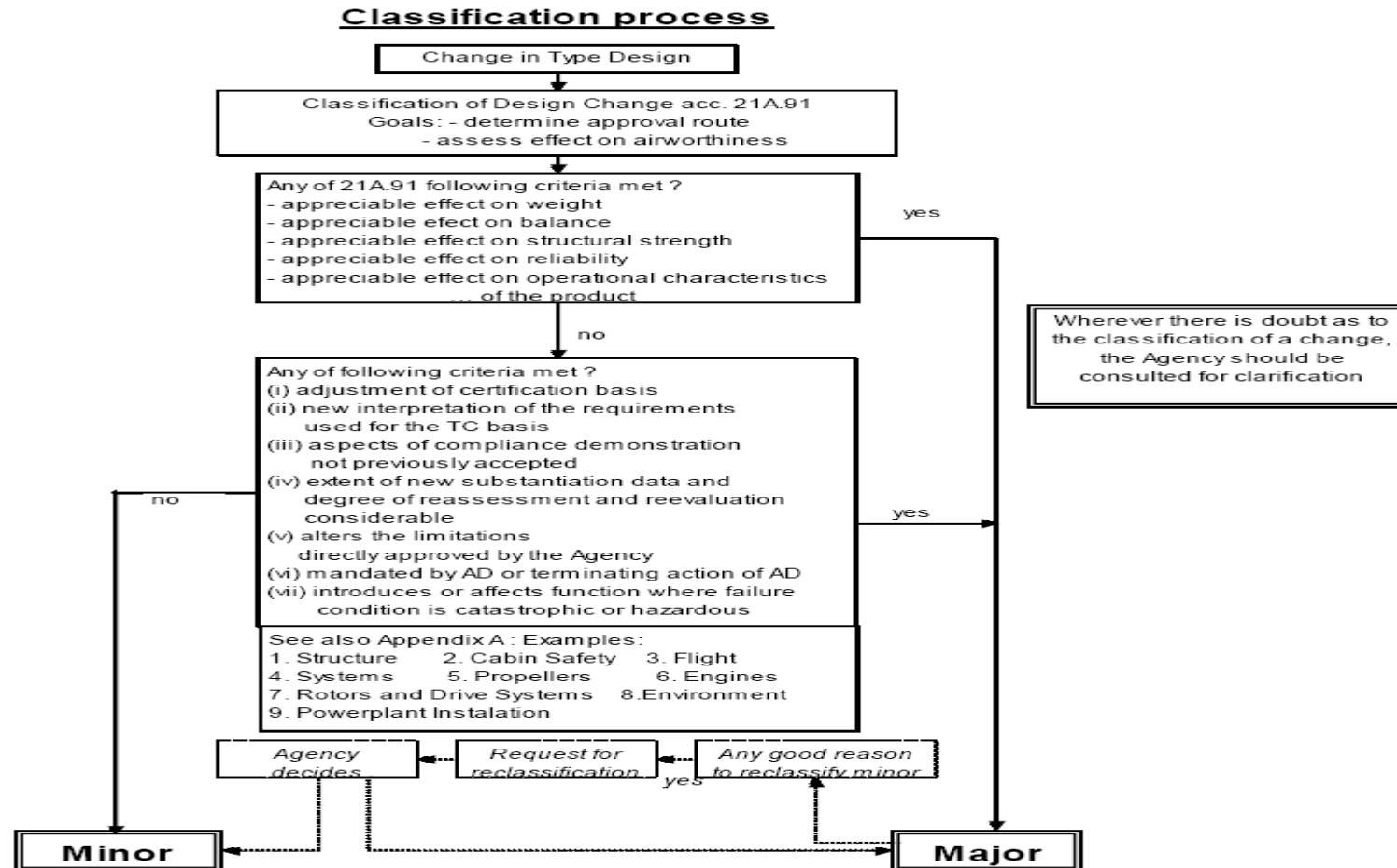
# certification

## ➤ Type Certificate – Changes

- Major Changes can be only requested by the Type Certificate holders
- Other applicants must apply for a STC (Supplemental Type Certificate) (subpart E of Part 21)
- Regarding minor changes, any organization can request for its approval
- In case of approved design organizations (DOA), the privilege of minor changes approval is transferred to them agreeing the procedure to be followed with EASA (see Part 21, 21.A.95(b))

# certification

## ➤ Type Certificate – Changes





# certification

## ➤ Type Certificate – Certification Process

- The process is conceptually the same for a new Type Certification and for an STC (Supplemental Type Certification)
- In general, the same process can be followed also for a military certification.
- Prior to afford a certification process, the industry declares formally the intention to certify via:
  - Either an application letter to the authorities (traditional way)
  - Completion of an application form (normally available in the web site of the corresponding authority).

# certification

## ➤ Type Certificate – Certification Process

- In general, the application includes basic data of the applicant, general data on the product to certify and a brief description of the new product or the modification intended to certify
- Sending the application letter to the authorities sets the reference date for definition of the applicable certification requirements and application validity. The TC must then be obtained within 5 years
- The certification process is normally divided in 4 phases:
- Technical Familiarization and establishment of the Type Certification Basis. The objective of this phase is to provide

# certification

## ➤ Type Certificate – Certification Process

technical information about the project to agree the initial Certification Basis. The Certification Basis usually include Certification Review Items (CRI) with topics to be discussed between the applicant and the Authority that are not directly included or that amends the certification specifications.

- Agreement of the Certification Plan. The objective of this phase is to agree the document that defines the interface with the authorities. It must be available since the very beginning of the. It is a document compiled by the certification team, but almost all the organization teams contribute with their inputs. The certification plan must include:
  - *Descriptive part: The first part of the certification plan is the description of the product or the modification to an existing product*



# certification

## ➤ Type Certificate – Certification Process

- *Certification basis and proposed Means of Compliance (MoC) for each paragraph*
- *List of compliance documents*
- *Program planning*
- Compliance demonstration. The objective of this phase is the demonstration of compliance with the Certification Basis and the acceptance by the Authority of the compliance demonstration. Every Showing Compliance document must be accompanied by a certification cover-sheet to demonstrate that:
  - Compliance with applicable certification requirements has been shown, attested with the signature of the SCE (Showing Compliance Engineer)

# certification

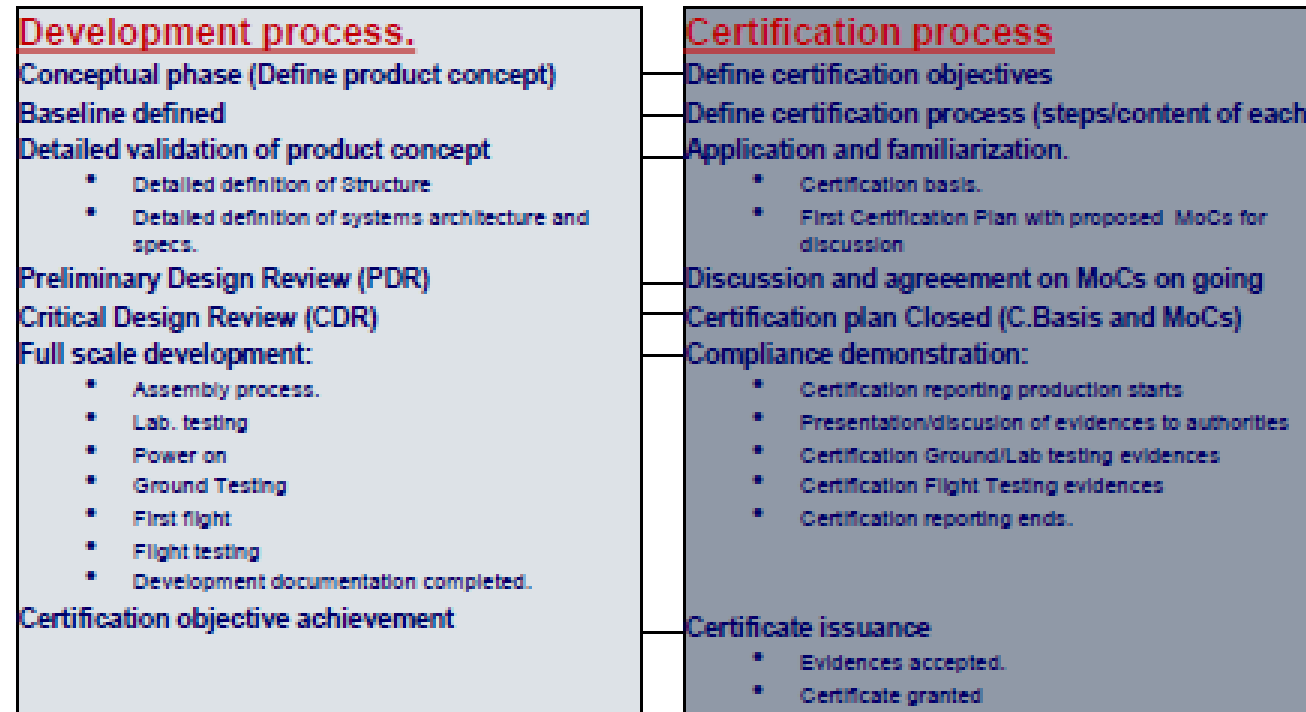
## ➤ Type Certificate – Certification Process

- Compliance with applicable certification requirements has been verified by the Airworthiness Nominee (AN) / Compliance Verification Engineer (CVE)
- Finally the release authorization is done by the responsible of the project in the Certification Organization
- For the cases where the Authority delegates approval of documents under DOA privilege, the signature of the certification cover sheet is equivalent to the Authority approval
- *Final Report and issuance of the Type Certificate.* The objective of this phase is the edition of a project final report and the issuance of the Type Certificate

# certification

## ➤ Type Certificate – Certification Process

- The Certification process shall be well fitted with the development phases of a project



# certification

## ➤ Certificates of Airworthiness

- Certificate of Airworthiness (CoA) is the document issued by the Airworthiness Authorities that allows the operation (fly) to any individual aircraft inside the limitations imposed
- It is an Individual Certificate for each aircraft
- It must be kept on-board and presented to the corresponding aviation authorities, if required
- It is issued to aircraft regarding a type certificate
- The most common ones are the following:

# certification

## ➤ Certificates of Airworthiness – EASA

- Standard (CoA)
  - Identifies technically an individual aircraft and allow its operation
- Permit to Fly (PtF)
  - Issued for flying prior to the certification of the aircraft (development or certification flight tests, etc) or when the CoA is temporarily invalid (damage, etc) but the

# certification

## ➤ Certificates of Airworthiness – RAD

- Issuance by INTA
- Standard (CoA)
  - Identifies technically an individual aircraft and allow its operation
- Experimental (CAE)
  - Issued for flying prior to the certification of the aircraft (development or certification flight tests, etc)
- Restricted (CAR)
  - Issued for aircraft with limited CoA



# certification

## ➤ DOA and ROD - Definition

- When granting a Design Organization Approval (DOA) or the Recognition as Design Organization by the Spanish Ministry of Defence (ROD), EASA, INTA or the authority giving the approval, confirms the capability of the organization to design aircraft, changes and repairs.
- This approval covers all the design related activities, including initial design, ground and flight testing, certification and continued airworthiness.
- DOA is the only means accepted by EASA to obtain and keep a Type Certificate or Supplemental Type Certificate.

# certification

## ➤ DOA and ROD - Definition

- Approval of Design Organizations is a benefit for both:
  - Airworthiness Authorities, that have limited resources
  - Industry that has good range of autonomy.



# certification

## ➤ DOA and ROD - Definition

- The applicable rule for the EASA approval is the Part 21 "Certification of aircraft and related products, parts and appliances, and of design and production organisations" that is an Annex to the European Commission Regulation (EC) N° 748/2012.
- The general rule dealing with the military airworthiness in Spain is the "Reglamento de Aeronavegabilidad de la Defensa" that has been published on 24th October 2015, superseding the former "Reglamento" issued in 2004.

# certification

## ➤ DOA and ROD - Definition

- In accordance with this rule, INTA has established the procedures:
  - ROD/PRO/GT/001/06 “Procedimiento de Reconocimiento de Organizaciones de Diseño (ROD)”
  - AER/PRO/7130/602/INTA “Requisitos de Acreditación de Organizaciones de Diseño”
- INTA is defining new ROD processes that probaly will converge to EASA DOA related processes

# certification

## ➤ DOA and ROD - Definition

- To be granted a DOA or ROD, an organization must demonstrate that:
  - It is capable to release design data after validation and verification of the compliance with airworthiness, operational suitability and environmental protection requirements by authorised and qualified staff;
  - All responsibilities are properly identified and discharged;

# certification

## ➤ DOA and ROD - Definition

- The design organisation, its responsibilities, activities and methods of work are properly documented through a Handbook and associated procedures;
- The documented procedures are adequate and subject to Independent
- Monitoring to ensure that their application is effective.

# certification

## ➤ DOA and ROD – Design Assurance System

- The Design Assurance System (DAS) covers all operational processes (design, airworthiness and Independent monitoring) to provide adequate confidence to EASA and INTA that the organisation has the capability:
  - To design products in accordance with the applicable airworthiness and environmental protection requirements
  - To show and verify the compliance with these requirements
  - To demonstrate to EASA / INTA this compliance
  - To independently monitor the compliance with DOA / ROD procedures (Design Organization Manual)

# certification

## ➤ DOA and ROD – Privileges

- An organization approved as DOA is to perform certification and airworthiness activities on behalf of EASA by using the following granted privileges:
  - The holder of this design organisation approval shall be entitled to perform design activities under Part 21 and within its scope of approval.
  - Subject to point 21.A.257(b), the Agency shall accept without further
- verification the following compliance documents submitted by the applicant
- for the purpose of obtaining:
  - 1. a type-certificate or approval of a major change to a type design; or
  - 2. a supplemental type-certificate; or
  - 3. a major repair design approval.

# certification

## ➤ DOA and ROD – Privileges

- An organization approved as DOA is to perform certification and airworthiness activities on behalf of EASA by using the following granted privileges:
  - The holder of this design organisation approval shall be entitled to perform design activities under Part 21 and within its scope of approval
  - Issuance of certification documents (related to type certificate and approval of major changes)
  - Classification of changes (major/minor) and approval of minor ones
  - ...

# certification

## ➤ DOA and ROD – Privileges

- An organization approved as DOA is to perform certification and airworthiness activities on behalf of EASA by using the following granted privileges:
  - Classification of changes (major/minor) and approval of minor ones
  - ...



## Airworthiness

- "Airworthy" RPAS means:
  1. The RPAS must conform to its type design. Configuration and the components installed are consistent with the drawings, specifications, other data or approved alterations that are part of the Type Certificate.
  2. The RPAS must be in a condition for safe operation. This refers to the condition of the RPAS relative to wear and deterioration, for example, skin corrosion, fluid leaks, tire wear, etc.

If either of these two conditions cannot be met, the RPAS is considered to be unairworthy.

## Type Certificate

- Before a newly developed RPAS model may enter into operation, it must obtain a Type Certificate from the responsible aviation regulatory authority.
- A Type Certificate is issued to signify the airworthiness of a RPAS manufacturing design or "Type".
- The Type Certificate (TC) implies that RPAS manufactured according to the approved design can be issued an Airworthiness Certificate

## **Airworthiness Certificate**

An Airworthiness Certificate is issued for an RPAS by the National Airworthiness Authority in the state in which the RPAS is registered.

The Airworthiness Certificate attests that the RPAS is airworthy insofar as the RPAS conforms to its Type Design.

# RPAS Military Certification



MILITARY UNMANNED AIR SYSTEMS (N.A.T.O.)

TYPE	MTOW	STANAG
FIXED WING	0 < MTOW < 150 Kg	4703
FIXED WING	150 < MTOW < 20.000 Kg	4671
ROTARY WING	0 < MTOW < 150 Kg	4746
ROTARY WING	150 < MTOW < 3.175 Kg	4702



# RPAS Civil Certification





**EASA**  
European Aviation Safety Agency

EU Regulation 2019/947 and 2019/945 set the framework for the safe operation of drones in European skies (EU and EASA Member States).

Main targets:

- Unmanned aircraft, irrespective of their mass, **can operate within the same Single European Sky** airspace, alongside manned aircraft, whether airplanes or helicopters.
- Considering the specific characteristics of UAS operations, they should be **as safe as those in manned aviation**.
- **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.



- The three main categories of UAS operations are:
  - ❑ the '[open](#)' category does not require a prior authorisation by the competent authority nor a declaration by the UAS operator before the operation takes place;
  - ❑ the '[specific](#)' category requires an authorisation by the competent authority before the operation takes place, taking into account the mitigation measures identified in an operational risk assessment
  - ❑ the '[certified](#)' category requires the certification of the UAS, a licensed remote pilot and an operator approved by the competent authority, in order to ensure an appropriate level of safety.



#### OPEN:

Low risk

Without involvement of Aviation Authority

Limitations ( Visual line of sight, Maximum Altitude, distance from airport and sensitive zones)

Flight over Populated area is possible if:

No overflying of crowds

Industry standards (Case of toy of less than 500 g)



#### SPECIFIC

Increased risk

Safety risk assessment

Approved by NAA possibly supported by Qualified Entities unless approved operator with privilege

Operation Authorisation with operations manual

Concept of accredited body

Airworthiness of drone and competence of staff based on risk assessment



#### CERTIFIED

Comparable to manned aviation

Limit between specific and certified is not yet defined

Pending criteria are defined, EASA accept application in its present remit

TC, C of A, Noise certificate, Approved Organisations, licences (Case of small drones)

Command and Control and Detect & Avoid can receive an independent approval



#### OPEN:

Low risk

Without involvement of Aviation Authority

Limitations ( Visual line of sight, Maximum Altitude, distance from airport and sensitive zones)

Flight over Populated area is possible if:

No overflying of crowds

Industry standards (Case of toy of less than 500 g)

UAS		Operation		Drone Operator/pilot		
Class	MTOM	Subcategory	Operational restrictions	Drone Operator registration	Remote pilot competence	Remote pilot minimum age
Privately built	< 250 g	A1 (can also fly in subcategory A3)	<ul style="list-style-type: none"> <li>- No flying expected over uninvolved people (if it happens, should be minimised)</li> <li>- no flying over assemblies of people</li> </ul>	No, unless camera / sensor on board <b>and</b> a drone is not a toy	- no training needed	No minimum age
Drones without class identification label	< 500 g			Yes	<ul style="list-style-type: none"> <li>- read user manual</li> <li>- complete the training and pass the exam defined by your national competent authority</li> </ul>	16*
Drones without class identification label	< 2 kg	A2 (can also fly in subcategory A3)	<ul style="list-style-type: none"> <li>- no flying over uninvolved people</li> <li>- keep horizontal distance of 50 m from uninvolved people (this can be reduced to</li> </ul>	Yes	<ul style="list-style-type: none"> <li>- read user manual</li> <li>- complete the training and pass the exam defined by your national competent authority</li> </ul>	16*
Drones without class identification label or privately built	< 25 kg	A3	<ul style="list-style-type: none"> <li>- do not fly near people</li> <li>- fly outside of urban areas (150 m distance)</li> </ul>	Yes	<ul style="list-style-type: none"> <li>- read user manual</li> <li>- complete the training and pass the exam defined by your national competent authority</li> </ul>	16*



#### OPEN:

Low risk



Without involvement of Aviation Authority

Limitations ( Visual line of sight, Maximum Altitude, distance from airport and sensitive zones)

Flight over Populated area is possible if:

No overflying of crowds















Industry standards (Case of toy of less than 500 g)

## Flying a Drone


Check the label on your drone if it has this mark

Have fun | Be responsible for safety

DO	DO NOT
 Make sure you are adequately insured	 Do not fly higher than 50 m from the ground
 Check your drone before each flight	 Do not fly over large crowds or groups of people
 Always keep the drone in sighting distance	 Do not fly near aircraft
 Keep your drone as far away as possible from other people, properties, vehicles and other aircraft	 Do not fly in the proximity of airports, helipads, areas affecting public safety or where an emergency response effort is ongoing
 Comply with the limitations of the area, zone or airspace, defined by your National Authority	 Do not interfere with the privacy of other people and use your drone responsibly
 Operate your drone within the performance limitations defined in the instructions provided by the manufacturer	 Do not take photographs, videos or sound recordings of people without their permission
	 Do not fly over sensitive or protected sites (prisons, military bases, power plants, etc.)
	 Do not make changes to the drone

FOR MORE INFORMATION ABOUT YOUR OBLIGATIONS, VISIT THE [DRONE.RULES.EU](http://drone.rules.eu) WEBSITE

[HTTP://EASA.EUROPA.EU/DRONES](http://EASA.EUROPA.EU/DRONES)





#### SPECIFIC

Increased risk

Safety risk assessment

Approved by NAA possibly supported  
by Qualified Entities unless approved  
operator with privilege

Operation Authorisation with  
operations manual

Concept of accredited body

Airworthiness of drone and  
competence of staff based on risk  
assessment

Operations under Specific category need an operational authorisation from the National Aviation Authority (NAA) where they are registered, operational authorisation before starting the operation.

The drone operator are required to conduct a risk assessment of the intended operation by using the methodology known as SORA, or an equivalent methodology accepted by the NAA, and submit the risk assessment and all identified means to mitigate the risk and comply with the operational safety objectives to the NAA.

If the NAA is satisfied with the information you provided, it NAA will issue an operation authorisation.





#### **SPECIFIC**

Increased risk

Safety risk assessment

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by Qualified Entities unless approved  
operator with privilege

Operation Authorisation with  
operations manual

Concept of accredited body

Airworthiness of drone and  
competence of staff based on risk  
assessment

## **Specific Operations Risk Assessment (SORA)**

- Risk assessment model to evaluate the risks related to a given operation and determine the boundaries for a safe operation.
- Required to support the application for an authorization to operate a UAS within the specific category.
- Can be applied where UAS certification may not be appropriate due to an operator/applicant's desire to operate a UAS in a limited or restricted manner.
- SORA considers:
  - Design
  - Operational mitigations
  - Threats of all nature for a specified hazard
- Carriage of people or payloads/weapons are excluded



#### SPECIFIC

Increased risk

Safety risk assessment

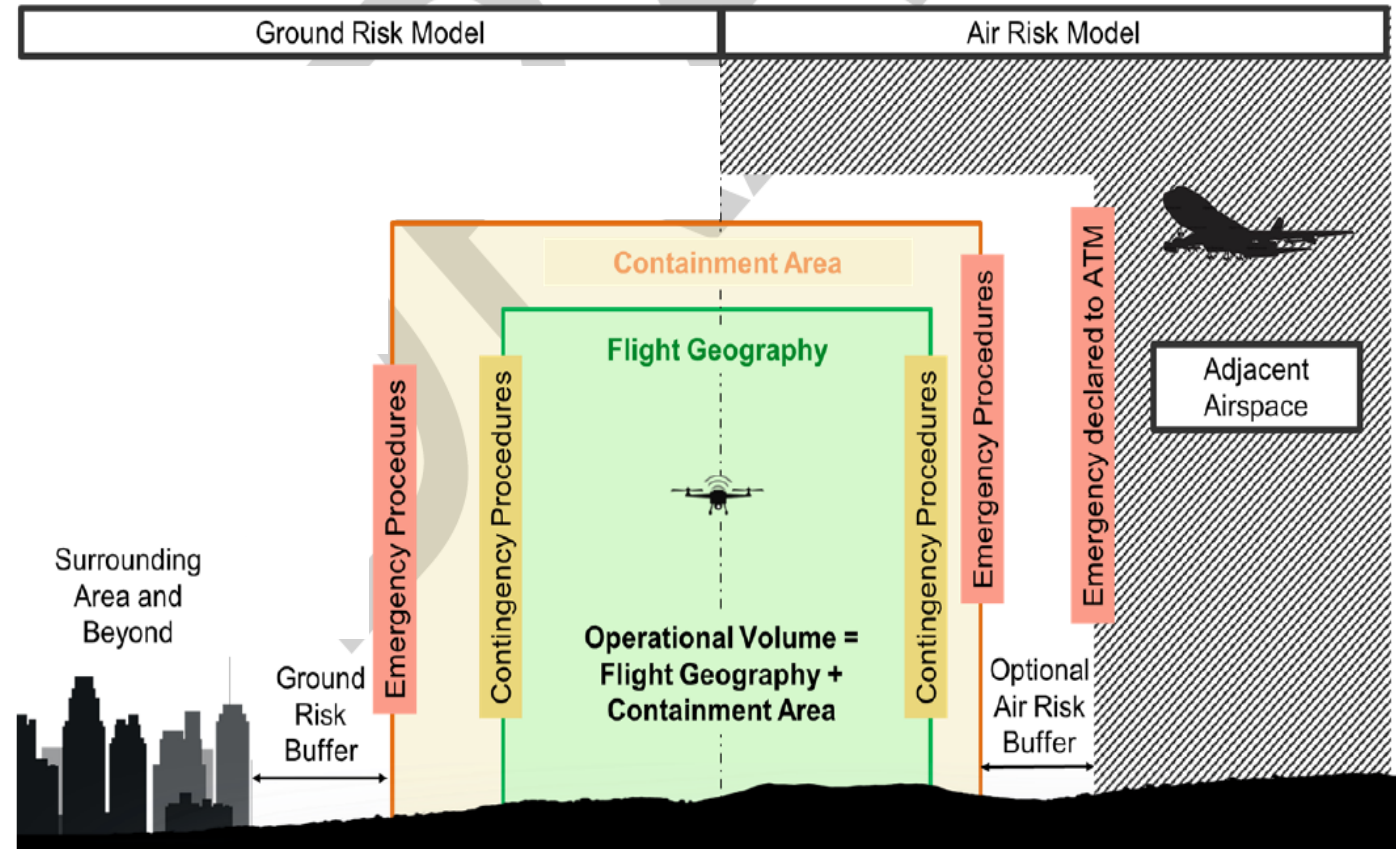
Approved by NAA possibly supported by Qualified Entities unless approved operator with privilege

Operation Authorisation with operations manual

Concept of accredited body

Airworthiness of drone and competence of staff based on risk assessment

## Specific Operations Risk Assessment (SORA)





### SPECIFIC

Increased risk

Safety risk assessment

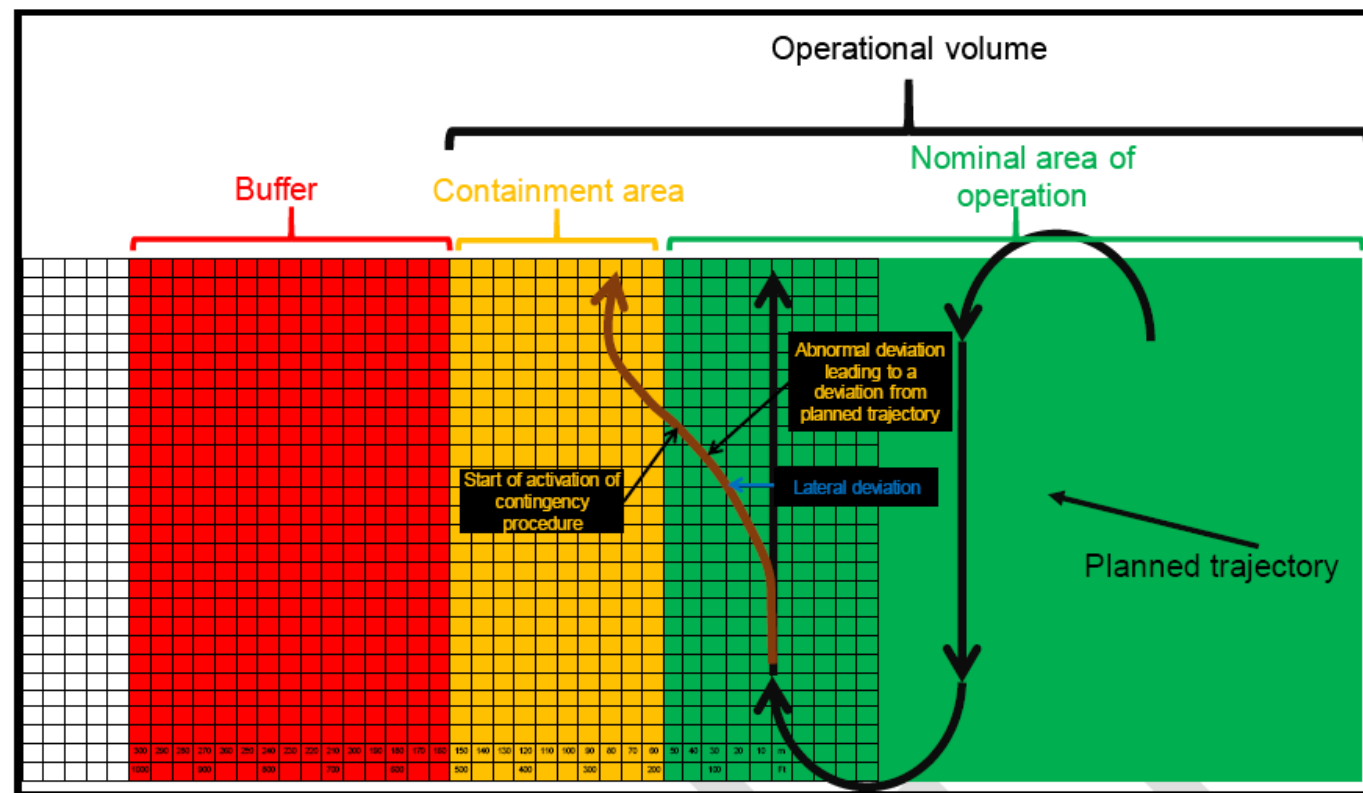
Approved by NAA possibly supported by Qualified Entities unless approved operator with privilege

Operation Authorisation with operations manual

Concept of accredited body

Airworthiness of drone and competence of staff based on risk assessment

## Specific Operations Risk Assessment (SORA)







#### SPECIFIC

Increased risk

Safety risk assessment

Approved by NAA possibly supported by Qualified Entities unless approved operator with privilege

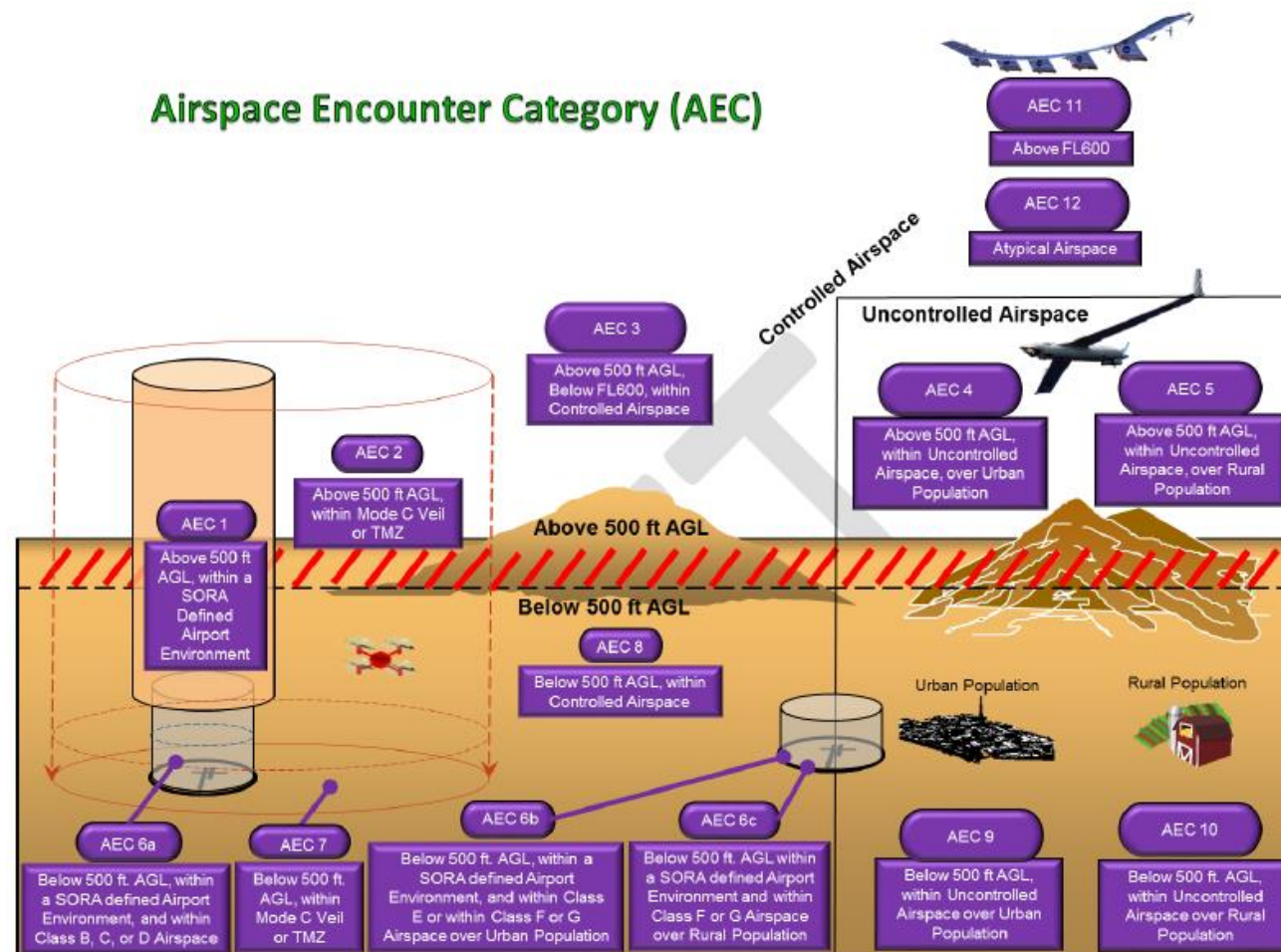
Operation Authorisation with operations manual

Concept of accredited body

Airworthiness of drone and competence of staff based on risk assessment

## Specific Operations Risk Assessment (SORA)

### Airspace Encounter Category (AEC)





#### CERTIFIED

Comparable to manned aviation

Limit between specific and certified is not yet defined

Pending criteria are defined, EASA accept application in its present remit

TC, C of A, Noise certificate, Approved Organisations, licences (Case of small drones)

Command and Control and Detect & Avoid can receive an independent approval

- UAS operations shall be classified under the 'certified' category when:
  - conducted over assemblies of people with a UAS with dimensions of more than 3m
  - involving the transport of people;
  - involving the carriage of dangerous goods, that may result in high risk for third parties in case of accident
  - the competent authority, based on the risk assessment provided by the UAS operator, 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.



#### CERTIFIED

Comparable to manned aviation

Limit between specific and certified is not yet defined

Pending criteria are defined, EASA accept application in its present remit

TC, C of A, Noise certificate, Approved Organisations, licences (Case of small drones)

Command and Control and Detect & Avoid can receive an independent approval

- UAS design, production and maintenance shall be 'certified' when:
  - (a) it has a characteristic dimension of 3 m or more, and is designed to be operated over assemblies of people
  - (b) it is designed for transporting people
  - (c) it is designed for the purpose of transporting dangerous goods and requiring a high level of robustness to mitigate the risks for third parties in case of accident
  - (d) it is used in the 'specific' category of operations and the risk of the operation cannot be adequately mitigated without the certification of the UAS.

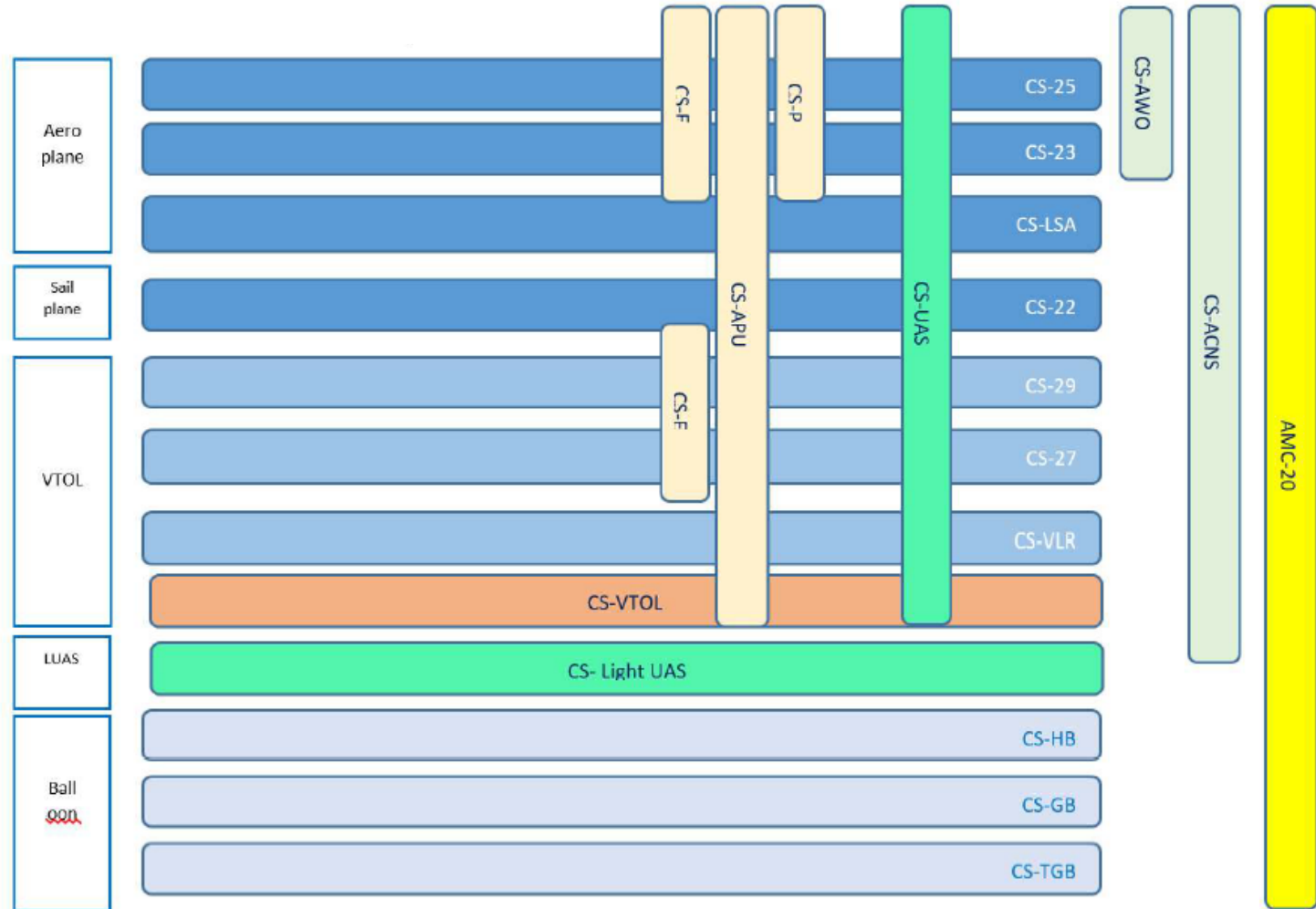
For the certified category:

- The UAS will always need to be certified (i.e. have a type certificate and a certificate of airworthiness)
- the UAS operator will need an air operator approval issued by the competent authority
- the remote pilot is required to hold a pilot licence. (where applicable, e.g. for UA with the highest level of automation a remote pilot may not be needed).



### CERTIFIED

Comparable to manned aviation  
 Limit between specific and certified is not yet defined  
 Pending criteria are defined, EASA accept application in its present remit  
 TC, C of A, Noise certificate, Approved Organisations, licences (Case of small drones)  
 Command and Control and Detect & Avoid can receive an independent approval







#### CERTIFIED

Comparable to manned aviation

Limit between specific and certified is not yet defined

Pending criteria are defined, EASA accept application in its present remit

TC, C of A, Noise certificate, Approved Organisations, licences (Case of small drones)

Command and Control and Detect & Avoid can receive an independent approval

Every UAS certification application shall be linked to a detailed definition of the operational volume, buffers and adjacent volumes, in terms of both ground and air risks, and any restriction, limitation and mitigation means which are assumed to be applicable for its operation.

The TC issued on that basis will only permit operations in this context.

An applicant must comply with SC using an acceptable means of compliance (AMC) issued by EASA, or another means of compliance which may include consensus standards, when specifically accepted by EASA.

For unusual designs and operations, and where suitable means of compliance have not been developed by EASA, it is expected that applicants will propose to the Agency new means of compliance or modified ones.





