Spain–UK–Belgium Comparative Legal Framework: Civil Drones for Professional and Commercial Purposes

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Abstract The aim of this study is to compare the regulations of the three European countries applied to drones or RPASs (remotely piloted aircraft systems) to find similarities and differences, particularly in the use of civil drones for professional and commercial purposes. This analysis gives a clear understanding of the requirements that each country establishes to operate with drones in its territory. As a general rule, countries regulate the activity of drones in their territory by residents in the country, although they leave the door open to operators from other countries to operate legally. In general, the focus of international and national regulations is given to safety. Nevertheless, small drones avoid many of these requirements, as they weigh less than 150 kg and pose fewer risks to people. However, bearing in mind that this kind of work could be related to creative industries, on a professional level, insurance should cover any property damage.

1 Introduction

Since approximately 2011 there has been an increasing tendency to legislate the use of drones in the civil sphere, countries being incorporated with more or less celerity into a regulatory process that is lengthened by the aeronautical approach adopted. Drones are rated as aircraft and treated as such in the use of airspace and in their relationship with other users, both active (other aircraft) and passive (people who

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are outside the scope of use but who may be affected), with a requirement for safety conditions in the operation that are comparable as far as possible to those of manned aviation.

As Bernauw (2016) highlights, Art. 8 of the Chicago Convention (ICAO 2006) subjects the operation of drones to national authorization. The consequence at present is a regulatory environment that differs between the respective countries, from permissive to restrictive, while the professional and commercial use of drones has an impact on safety that must be addressed.

In countries that already have legislation, there is evidence of some homogeneity in some aspects of regulation, as is the case with the weight limits (MTOW, maximum take-off weight) of regulated aircraft, the operation limits (height, distance to the pilot, etc.), or the registration requirements for the operator, although there is no harmonized regulation in common spaces such as the European Union (EU). In this regard the strategy has been defined to achieve common European legislation (towards 2018), and working groups have been established to develop it under the ward of the Council, the European Commission, and the European Parliament, with the EASA (European Aviation Safety Agency) working on drafting legislation.

Bearing in mind that, although there will be a common European regulation, there will always be differences from the regulation of other countries outside the EU. The approach of this study is to attain adequate practical knowledge of the regulation of each country to provide academia with a comparative legal framework as well as to give the user a tool to obtain this information. The parameters analysed are:

- Updated legislation applied in each country;
- Limitations for operating drones;
- Compulsory requirements for operators, drones, and pilots to operate drones.

As a sector that is in the process of settlement and based on technologies that evolve very quickly, it is important to keep in mind at all times that there will be a frequent dynamic of changes and updates of legislation until standardized forms of technology utilization are adopted. For this reason references are included to regulatory agencies and links to the information sources, with the date of the last version of legislation in force.

A table has been drawn up (Table 1) to provide a reference document containing adequate knowledge of the specific legislation. The nomenclature and explanation of the sections are detailed. The table's format tries to parameterize or group the most relevant aspects of each of the regulations under study in sections that are common or at least similar. Although at first glance this is a complicated task due to the different ways of approaching drones' operation, control, and regulation in each country, some common areas have been defined to provide an appropriate guide to be introduced in each piece of legislation.

Table 1 Proposal for a reference document to compare drone regulations related to operators and pilots

	Country	Current regulation
	Parameters	Comments
<i>Administration and regulation</i>		
Regulatory body	Regulatory body name	Link provided in the reference list
Date of last normative update	Date of last normative update	Law that publishes it
Normative identification	Normative name	Link provided in the reference list
<i>Limits to operation</i>		
MTOW (maximum take-off weight)	Value	Maximum take-off mass limit value
Divisions according to MTOW	Value	Value that limits divisions
Maximum flight height	Value	Value
VLOS (visual line of sight)	Value	Explanation of conditions
VLOS—distance to pilot	Value	Explanation of conditions
EVLOS (extended visual line of sight)	Value	Explanation of conditions
BVLOS (beyond visual line of sight)	Value	Explanation of conditions
Number of RPASs piloted by the same pilot	Value	Value
Areas of operation	Description	Explanation if needed
Periods of operation	Value	Explanation if needed
Dangerous goods and substances shipped	Value	Explanation if needed
Flight zones	Aeronautical zone	Requirements
Distance from airports	Value	Explanation if needed
<i>Requirements for the operator (Documentation)</i>		
Registration request	Value (yes/no)	Explanation if needed
Test flight request	Value (yes/no)	Explanation if needed
RPAS characterization sheet	Value (yes/no)	Explanation if needed
Safety study	Value (yes/no)	Explanation if needed
Operation manual	Value (yes/no)	Explanation if needed
Maintenance manual	Value (yes/no)	Explanation if needed
Additional measures	Value (yes/no)	Explanation if needed
Incident notifications	Value (yes/no)	Explanation if needed
Civil liability insurance	Value (yes/no)	Explanation if needed
Requirements according to operators' origin	Value	Explanation if needed
Special permit to operate for foreigners	Value	Explanation if needed

(continued)

Table 1 (continued)

	Country	Current regulation
	Parameters	Comments
<i>Requirements for pilots</i>		
Type of qualification (license)	Type	Explanation if needed
Basic	Value	Explanation if needed
Advanced	Value	Explanation if needed
Practical qualification	Value	Explanation if needed
Requirements	Value	Explanation if needed
Flight/training hours	Value	Explanation if needed
Divisions according to MTOW	Value	Explanation if needed
Medical certificate	Value (yes/no)	Explanation if needed
Language	Value	Explanation if needed
Radiophonist license	Value	Explanation if needed
<i>Requirements for RPASs</i>		
Identification/registration	Element	Explanation if needed
Airworthiness certification	Value	Explanation if needed
Command and control link	Value	Explanation if needed
Maintenance	Type	Explanation if needed
Test flights	Type	Explanation if needed
<i>Requirements for operation</i>		
Previous communication	Value	Explanation if needed
Permission	Value	Explanation if needed
Non-segregated airspace	Value	Explanation if needed
Exceptions	Value	Explanation if needed
Use of RPASs in emergency cases	Value	Explanation if needed
RPAS protection and recovery areas	Value	Explanation if needed
VLOS	Value	Explanation if needed
EVLOS	Value	Explanation if needed
BVLOS	Value	Explanation if needed

Source Own elaboration

2 Regulatory Framework General Evolution

For some years aeronautical authorities have been concerned about the generalization of drones’ use, and since 2011 an important effort has been made to integrate these aircraft into the air space with the maximum safety conditions for all users. The problems are the coordination of the different sensitivities and the establishment of a technical scheme suitable for all countries. From the ICAO (International Civil Aviation Organization), coordination is attempted somehow mildly, and the main efforts are exerted through the JARUS organization (Joint

Authorities for Regulation of Unmanned Systems) or through the States within the European Union. Consequently, as it can be seen, different actors influence this regulatory framework, which can sometimes be confusing.

2.1 European Parliament Ruling on Drones

Being aircraft, drones have to comply with aviation safety rules. International civil aviation rules at the United Nations level have prohibited unmanned aircraft from flying over another state's territory without its permission since 1944. In the EU the current regulatory system for drones is based on fragmented rules, with many Member States having already regulated or planning to regulate some aspects of civil drones with an operating mass of 150 kg or less. The responsibility for civil drones of over 150 kg is left to the European Aviation Safety Agency (EASA). However, the extent, content, and level of detail of national regulations differ, and conditions for mutual recognition of operational authorization between EU Member States have not been reached.

In 2012, having completed a set of consultations, the Commission published a staff working document on the civil use of RPASs and established a European RPAS steering group to plan and coordinate EU work on civil RPASs. In 2013 the steering group presented its recommendations in a roadmap that covers all types of RPASs except model aircraft and toys. The roadmap identifies potential improvements to the existing regulatory framework and outlines the research and technologies necessary for the safe integration of RPASs into the EU aviation system.

Subsequently, in 2014 the Commission adopted a Communication outlining a strategy for opening the aviation market to the civil use of RPASs in a safe and sustainable manner. It focuses on how to enable the development of RPASs while at the same time addressing their societal impact. The Commission noted its intention to take a step-by-step approach by first regulating drone operations with mature technologies. More complex operations would be permitted progressively. In the longer term, the objective is to integrate RPASs into non-segregated airspace, which is open to all civil air transport.

2.2 European Aviation Safety Agency (EASA)

The European Aviation Safety Agency (EASA) has been tasked by the European Commission to develop a regulatory framework for drone operations and proposals for the regulation of “low-risk” drone operations. To achieve this, the EASA is working closely with the Joint Authorities for Regulation of Unmanned Systems (JARUS).

Regulation (EC) No. 216/2008 mandates the Agency to regulate unmanned aircraft systems (UASs) and in particular remotely piloted aircraft systems (RPASs)

when used for civil applications and with an operating mass of 150 kg or more. Experimental or amateur-built RPASs, military and non-military governmental RPAS flights, and civil RPASs below 150 kg, as well as model aircraft, are regulated by the individual Member States of the European Union.

The EASA has been tasked by the European Commission—following the Riga Conference (held in 2015) and its associated Declaration—to develop a regulatory framework for drone operations as well as concrete proposals for the regulation of low-risk drone operations.

The “Advance notice of proposed amendment 2015-10” (A-NPA) (EASA 2015a) reflects the principles laid down in the Riga Declaration. It follows a risk- and performance-based approach; it is progressive- and operation-centric. It introduces three categories of operations as already proposed in the published EASA “Concept of operations for drones”:

- An “open” category (low risk): safety is ensured through operational limitations, compliance with industry standards, requirements for certain functionalities, and a minimum set of operational rules. Enforcement shall be ensured by the police. In this group we could also include indoor drones.
- A “specific operation” category (medium risk): authorization by National Aviation Authorities (NAAs), possibly assisted by a qualified entity (QE) following a risk assessment performed by the operator. A manual of operations shall list the risk mitigation measures.
- A “certified” category (higher risk): requirements comparable to manned aviation requirements. Oversight by NAAs (issue of licences and approval of maintenance, operations, training, air traffic management (ATM)/air navigation services (ANS), and aerodrome organizations) and by the EASA (design and approval of foreign organizations).

This regulatory framework will encompass European rules for all drones in all weight classes. The amendments to Regulation (EC) No. 216/2008 that are underway will reflect the above.

Besides, in December 2015 the Agency published a Technical Opinion (EASA 2015b) that contains, in its section 4, an update of the roadmap published by the European RPAS Steering Group (ESRG) in 2013 (ESRG 2013). This Technical Opinion is the result of the consultation performed with A-NPA 2015-10. It has been developed in parallel to the draft modifications to Regulation (EC) No. 216/2008 (hereinafter referred to as the “Basic Regulation”) included in the “Aviation Strategy to Enhance the Competitiveness of the EU Aviation Sector” (hereinafter referred to as the “Aviation Strategy”), published on 7 December 2015.

The Agency also supports the work of the ICAO (International Civil Aviation Organization) UAS Study Group. The ICAO published Circular 328 (2011) on UASs and amended Annexes 2, 7, and 13 to the Chicago Convention to accommodate RPASs intended to be used by international civil aviation.

Moreover, the EASA is member of the Joint Authorities for Rulemaking on Unmanned Systems (JARUS), which is currently developing recommended requirements for:

- Licensing of remote pilots;
- RPASs in visual (VLOS) and beyond line-of-sight (BVLOS) operations;
- Civil RPAS operators and approved training organizations for remote pilots (JARUS-ORG);
- Certification specifications for light unmanned rotorcraft (CS-LURS) and aeroplanes (CS-LURS) below 600 kg;
- Performance requirements for “detect and avoid” to maintain the risk of mid-air collision below a tolerable level of safety (TLS) and taking into account all the actors in the total aviation system;
- Performance requirements for command and control data link, whether in direct radio (RLOS) or beyond line-of-sight (BRLOS) and in the latter case supported by a communication service provider (COM SP);
- Safety objectives for the airworthiness of RPASs (“1309”) to minimize the risk of injuries to people on the ground; and
- Processes for airworthiness.

The EASA has already published:

- Guidance material to support approved design organizations (DOA or AP-DOA) in selecting the appropriate certification specifications (among the ones applicable to manned aviation) from which to build the certification basis for RPAS design (see E.Y013-01);
- NPA 2012-10 to transpose amendment 43 to ICAO Annex 2 into the Standard European Rules of the Air (SERA).

2.3 Joint Authorities for Regulation of Unmanned Systems (JARUS)

JARUS is a group of experts gathering regulatory expertise from all around the world. At present 48 countries, as well as the European Aviation Safety Agency (EASA) and EUROCONTROL, are contributing to the development of JARUS’s work products. Participation in JARUS is open to all regulatory authorities with expertise in unmanned or remotely piloted aircraft systems.

The purpose of JARUS is “to recommend a single set of technical, safety and operational requirements for all aspects linked to the safe operation of the Remotely Piloted Aircraft Systems (RPAS). This requires review and consideration of existing regulations and other material applicable to manned aircraft, the analysis of the specific tasks linked to RPAS and the drafting of material to cover the unique features of RPAS” (JARUS [2015a](#)).

The JARUS guidance material aims to facilitate each authority to write its own requirements and to avoid duplicate efforts. The work is performed by the JARUS working groups; seven WGs are active at this moment (JARUS 2015b): WG1 Flight Crew Licensing, WG2 Operations, WG3 Airworthiness, WG4 Detect & Avoid, WG5 Command, Control & Communications, WG6 Safety & Risk Management, WG7 Concept of Operations.

In the last three years, it has published and made available to the RPAS community some deliverables to clarify concepts or recommend some uses. It is working to provide further inputs into the development of RPAS and UAS regulatory guidance and recommendations in domains in which other organizations (e.g. the ICAO) have not been active.

JARUS is creating a high-level framework that will be at the heart of the development effort. This effort is based on a number of high-level “concepts of operations” (CONOPS) addressing the key elements of the operation of UASs. These CONOPS set high-level assumptions that should guide the work activities in the coming years. They are aimed at providing a stable yet flexible environment, in which JARUS’s work products can be developed and amended as necessary. This will allow innovation to take place with a level of certainty. The members of JARUS have agreed to develop these CONOPS for the following subjects:

- Regulatory oversight with three categories—A, B, and C or open, specific, and certified;
- UAS operational categorization;
- Specific operational risk assessment specifications (SORA);
- ATM concepts for different operations;
- The detect and avoid concept for visual line of sight, extended, and beyond visual line of sight;
- Command and control, from the simplest to the most complex systems.

After JARUS has reached consensus on these concepts, other deliverables—such as operational, technical, safety, and operational requirements and certification specifications—will be derived to support them.

2.4 International Civil Aviation Organization (ICAO)

In the previous section on the AESA, we introduced this United Nations specialized agency. Established by States in 1944, it manages the administration and governance of the Convention on International Civil Aviation (Chicago Convention). The ICAO works with the Convention’s 191 Member States and industry groups to reach consensus on international civil aviation standards and recommended practices (SARPs) and policies in support of a safe, efficient, secure, economically sustainable, and environmentally responsible civil aviation sector. These SARPs

and policies are used by ICAO Member States to ensure that their local civil aviation operations and regulations conform to global norms.

The ICAO has developed the UAS Toolkit (ICAO 2017) as a guide to assist States that are working on the development of UAS operational guidance, regulation, and enabling operation in a safe manner. This Toolkit provides interesting guidance to take into account, but users should always be aware that it could be updated.

There seems to be a general consensus that unmanned aircraft must be allowed to operate without segregation from other air space users (Bernauw 2016).

3 Legal Framework of Spain

According to Pauner-Chulvi (2016), Spain was one of the first European countries to pass a technical regulation on drones.

At the national level, the body responsible for regulating the activity of drones is the State Agency for Air Safety (AESA), under the General Secretariat of Transport (Ministry of Development). It is the aeronautical authority and is responsible for the supervision, inspection, and management of air transport, air navigation, and airport security (AESA 2017a). In addition, it assesses the risks in air transport safety through threat detection, risk analysis and evaluation, and a continuous process of control and mitigation of risks. It also has sanctioning power over violations of civil aviation regulations.

Within its activity it is responsible for developing the regulation of operations with drones up to 150 kg and for monitoring their compliance and operation. The drone section has been framed within the Aircraft Safety Directorate, with the description of remote control piloted aircraft units (RPASs).

As the first action, Royal Decree-Law 8/2014 was passed on 4 July, giving “approval of urgent measures for growth, competitiveness and efficiency”, in which section 6 included the temporary regime for operations with remotely piloted aircraft, drones, weighing less than 150 kg at take-off.

Subsequently, this legislation was processed as a law, Law 18/2014, on 15 October 2014, giving “approval of urgent measures for growth, competitiveness and efficiency” (AESA 2014), which is currently in force. This regulation responded to the need to establish a legal framework that would allow the safe development of a technologically advanced and emerging sector, and from the beginning it was promised that it would be developed in the short term, the Administration being aware that it was a temporary solution that needed to be improved.

This temporary regulation contemplates the different scenarios in which the different aerial works can be realized, depending on the aircraft’s weight. Besides,

the conditions now approved are supplemented by the general scheme of Law 48/1960, 21 July, on air navigation and establish the operating conditions of this type of aircraft in addition to other obligations.

Legislation on drones in Spain was published in a somewhat accelerated way in July 2014, to alleviate the sense of freedom, reinforced by the lack of information, that had spread among users over the misconception that “if it is not forbidden, it is permitted”. With regard to aircraft, such as aircraft flying within certain defined parameters, there had always been legislation, and the use of model aeroplanes for many years, being restricted to a specific environment (that of fans and aeromodelling clubs), had not posed major problems.

However, the appearance of drones and the extension of their use outside the domain of model aircraft increased the number of users and potentially dangerous situations at the same time as a professional activity “sub-sector” was being formed, gaining size on a base lacking legal solidity.

By the end of 2013 and early 2014, a number of incidents involving drones had occurred, which motivated the accelerated position taken by the Ministries of Development, Defence, and Industry and the elaboration of regulations that were presented as “provisional” pending more elaborate and refined legislation.

Royal Decree 8/2014 covered the regulation of RPASs, conforming to a scenario of use that evidenced certain deficiencies but giving the possibility to undertake work and activities using drones in a legal way. Subsequently Law 18/2014 was approved.

In the years afterwards, work was carried out on new legislation to improve the aforementioned and currently in force legislation with a draft that has already circulated in its final versions and that seems only to be waiting for its approval by the Government.

Given the imminence of this new legislation, it has been considered appropriate to include and consider it at the same level as Law 18/2014, which is in force, to achieve adequate knowledge about a reality that seems close, although it must be borne in mind that changes may still be made to the wording of some points of this new regulation. The version has been developed by the Ministry of Public Works and Transport and the Ministry of Defence (2016).

To gain an adequate understanding of the regulation of drones and how it applies, it is necessary to examine the “guidance material” published by the State Agency for Air Safety (AESA 2017b), which articulates the implementation of the law.

3.1 Current Regulation

At the moment the regulation in force is defined by the following parameters (Table 2):

Table 2 Administration and regulation in Spain

	Spain	Actual regulation
	Parameters	Comments
<i>Administration and regulation</i>		
Regulatory body	AESA	AESA: drones less than 150 kg EASA: drones more than 150 kg
Last updated normative	15 October 2014	BOE (State Official Bulletin) 17 October 2014
Normative identification	Law 18/2014 Section 6th Civilian aeroplanes piloted by remote control	Article 50 distinguishes drones less than 2 kg, drones less than 25 kg, and drones less than 150 kg

Source Own elaboration

3.2 New Regulation and Comparison

There is the intention on the part of the Spanish Administration to update the legislation on drones in the short term, and it has elaborated a draft of regulation that is waiting for the last political formalities for its approval and publication.

A comparative analysis of the two regulations is displayed in Table 3. As we can observe, some parameters have no changes, while others are more detailed or adjusted.

4 Legal Framework of the UK

In the UK the administration authority in charge of civil drones is the Civil Aviation Authority (CAA). In relation to drones (CAA 2017a), the regulation separates drones as follows: up to 7 kg or up to 20 kg (small) and up to 150 kg (light). Art. 94 of the Air Navigation Order (CAA 2017b) and the regulations made under the order exclude small drones from some obligations.

However, this depends on the use of the drone. It is not compulsory to register a personal drone or obtain a permit for a recreational drone in the UK, but, if the drone is used for professional work, then a Permission for Aerial Work is needed, which has to be renewed annually (CAA 2017a).

The basic parameters are the following:

- Line of sight (LOS) at a maximum height of 400 ft (122 m);
- 500 m of distance horizontally;
- In any case fly away from aircraft, helicopters, airports, and airfields;
- If fitted with a camera, a drone must be flown at last 50 m away from a person, vehicle, building, or structure not owned or controlled by the pilot;
- Camera-equipped drones must not be flown within 150 m of a congested area or large group of people, such as a sporting event or concert.

Table 3 Comparative analysis of regulations in Spain

	Spain		Current regulation		Spain		New regulation	
	Parameters		Comments		Parameters		Comments	
<i>Administration and regulation</i>								
Regulatory body	AESA				AESA		No changes	
Last normative update	15 October 14		BOE 17/10/2014		Pending			
Normative identification	Law 18/2014 Section 6		Article 50		Pending			
<i>Limits for operation</i>								
MTOW	<25 kg				<25 kg		No changes	
Divisions according to MTOW					<10 kg		To fly over populated areas; new regulation	
Maximum flight height	120 m				120 m		No changes	
VLOS	MTOW <25 kg		Keeping control of aircraft at all times from a ground control station (GCS)		MTOW <25 kg		No changes	
VLOS—distance to pilot	<500 m		Keeping visual contact		<500 m		No changes	
EVLOS			Not allowed		MTOW <25 kg		Observers within 500 m distance from pilot and communicated	
BVLOS	MTOW <2 kg		Keeping control of aircraft at all times from a GCS		MTOW <2 kg		No changes	
BVLOS					MTOW <25 kg		Mandatory detect and avoid (D&A) system on board or in segregated airspace	

(continued)

Table 3 (continued)

	Spain Parameters	Current regulation Comments	Spain Parameters	New regulation Comments
Number of RPASs piloted by the same pilot	1		1	No changes
Areas of operation		Non-populated areas or buildings		No changes
		Non-controlled airspace		No changes
			Urban areas and over populated zones	Probably no changes, depending on risk
Periods of operation	Daytime	Always	Daytime/night-time	Specific safety requirement
Dangerous goods and substances shipped	No		No	No changes
Flight zones	Non-controlled airspace	Regular safety study	Non-controlled airspace	No changes
			Controlled airspace or FIZ (flight information zone)	Specific safety study
Distance from airports	>8 km or >15 km with the instrument flight rules (IFR) system	A shorter distance is allowed when agreed and coordinated with airport management	To be determined (TBD)	Agreed and coordinated with airport management—specific safety study
<i>Requirements for the operator (Documentation)</i>				
Registration request	Yes	Declaration	Yes	No changes
Test flight request	Yes	Previous to definitive registration	Yes	No changes

(continued)

Table 3 (continued)

	Spain	Current regulation		Spain	New regulation	
	Parameters	Comments		Parameters	Comments	
RPAS characterization sheet	Yes	For each RPAS		Yes	No changes	
Safety study	Yes	For each scenario		Yes	No changes	
Operation manual	Yes			Yes	No changes	
Maintenance manual	Yes			Yes	No changes	
Additional measures	Yes	To avoid interference		Yes	No changes	
Incident notifications	Yes	Mandatory		Yes	No changes	
Civil liability insurance	Yes	For each aircraft, €300 k min.		Yes	No changes	
Requirements according to operators' origin	Open			Open	No changes	
Special permit to operate for foreigners	Open	Official language competency is mandatory		Open	No changes	
<i>Requirements for pilots</i>						
Type of qualification (license)	Qualification	Not a license		Qualification	No changes	
Basic	50 h	VLOS—on-site and online (with 5 h onsite session) + on-site exam		50 h	No changes	

(continued)

Table 3 (continued)

	Spain Parameters	Current regulation Comments	Spain Parameters	New regulation Comments
Advanced	60 h	BVLOS—on-site and online (with 6 h on-site session) + on-site exam	60 h	No changes
Practical qualification	For each aircraft	Specific aircraft, almost a type certificate	For each aircraft	No changes
Requirements		On-site theoretical class 5 h + theory exam + practical exam		No changes
Flight/training hours	No		Yes	>3 h in the last 3 months for each category of aircraft
Divisions according to MTOW	<5 kg; <15 kg	To be considered as similar RPASs for qualification	<5 kg; <15 kg	No changes
Medical certificate	Yes	LAPL certificate (light aircraft pilot licence) or class 2 certificate until the LPAL is in force	Yes	LPAL certificate (as for light aircraft manned piloting certificate)
Language	ESP		ESP	No changes
Radiophonist license	No	Current regulation	Yes	For flights in controlled airspace
<i>Requirements for RPASs</i>				
Identification/registration	Identification plate	MTOW <25 kg	Identification plate	No changes
	Registration	MTOW >25 kg	Registration	No changes
Airworthiness certification	MTOW >25 kg		MTOW >25 kg	No changes
Command and control link		At all times		No changes
Maintenance	Maintenance programme	Provided by the manufacturer	Maintenance programme	No changes

(continued)

Table 3 (continued)

	Spain Parameters	Current regulation Comments	Spain Parameters	New regulation Comments
Test flights	Previous	For operator registration, to demonstrate that operation is performed safely	Previous	No changes
<i>Requirements for operation</i>				
Previous communication	Yes	Registration	Yes	No changes
Permission	Yes	Specific and temporary for testing flights	Yes	For flights in controlled traffic regions (CTRs), BVLOS, or populated areas
Non-segregated airspace	Yes	Mandatory	Yes	Mandatory but other scenarios are considered with permission
Exceptions	No	CTR or FIZ flights are not allowed	Yes	CTRs, FIZs, or populated areas
Use of RPASs in emergency cases	Yes	Exemptions are considered in emergency cases	Yes	Specific exemptions are stated for operation in emergency cases
RPAS protection and recovery areas	No	Not allowed	Yes	R >30 m for take-off and landing
VLOS	Yes	MTOW <25 kg	Yes	No changes
EVLOS		Not allowed	MTOW <25 kg	Observers within 500 m distance from the pilot and communicated
BVLOS	MTOW <2 kg	Issue of notice to airmen (NOTAM)	MTOW <2 kg	No changes
BVLOS	2 <MTOW <25 kg	Segregated airspace	2 <MTOW <25 kg	With a D&A system in non-controlled airspace—without a D&A system in segregated airspace

Source Own elaboration and EASA (2017)

It is important to respect “no fly zones”, which depend not only on the city or town but also on the commons. For example, in London, London’s royal parks, Wimbledon Common, Putney Common, and Clapham Common, among others, are no-drone zones. In other cases, such as the borough of Lambeth, a commercial licence is necessary. Therefore, it is better to check with the local council before flying. There is still confusion in some areas about whether drones are permitted or not.

In the case of private property, it is possible to fly in the airspace above (but not higher than the general rule of 400 ft) as long as it does not cause a nuisance, infringe privacy, or otherwise interfere with the “ordinary use and enjoyment” of the land.

On the other hand, the regulation makes no distinction between indoor or outdoor flights in the case of commercial work. Certain hazard factors are heavily mitigated by the fact that the aircraft is flying in an enclosed environment and access to the venue can be controlled (CAA 2017a).

The UK Government is proposing to change the regulations so that any recreational drone weighing more than 250 g has to be registered. Ministers also want drones to be “electronically identifiable” on the ground so that their owners can be tracked. They are also proposing increases to the maximum fine for flying in a no-fly zone, which is currently limited to £2500.

It is not necessary to have drone insurance by law, but it will protect the operator against claims. Moreover, endangering an aircraft in flight is a criminal offence in the UK, and anyone convicted of the charge can face a prison term. Some drones have the capacity to geo-fence restricted areas, such as airports. They can also be used in “beginner” modes, which limit the height and distance that the quadcopter can fly away from the user.

In Table 4 we can observe the different parameters according to UK regulation. As our first observation, we can notice that the UK regulation is less detailed than the Spanish one reviewed.

5 Legal Framework of Belgium

The Belgian Civil Aviation Authority (BCAA) published the Royal Decree of 10 April 2016 “concerning the use of remote controlled aircrafts in the Belgian airspace”, which regulates drone operations. It normalizes both the private and the professional use of drones and introduces a registration obligation for drones, regulates the certificates, and defines the authorized take-off and landing spots for registered drones. Moreover, manufacturers of drones need technical requirements, the delivery of conformity certificates, the drafting of a flight manual and safety analysis reporting, maintenance requirements, flight tests, and so on.

According to the BCAA (2017), we can distinguish five types of operations:

Table 4 UK current regulation

	UK	Current regulation
	Parameters	Comments
<i>Administration and regulation</i>		
Regulatory body	CAA	CAA: drones less than 150 kg EASA: drones more than 150 kg
Last normative update	22 February 2017	Differences between drones up to 7 kg and drones up to 20 kg (small)
Normative identification	The Air Navigation Order 2016	Article 94
<i>Limits for operation</i>		
MTOW	<20 kg	
Divisions according to MTOW	<7 kg; <20 kg	
Maximum flight height	122 m	
VLOS	MTOW <20 kg	
VLOS—distance to pilot	<500 m	Keeping visual contact
EVLOS		Need for special approval
BVLOS	MTOW <7 kg	
Number of RPASs piloted by the same pilot	1	
Areas of operation	Limited	Non-populated areas or buildings (min. 150 m)
		Not closer than 50 m to any person
Periods of operation		Always
Dangerous goods and substances shipped	No	
Flight zones	Non-controlled airspace	Safety study
Distance from airports	Yes	Check no-fly zones (http://www.noflydrones.co.uk)
<i>Requirements for the operator (Documentation)</i>		
Registration request	No	Unless commercial: operator's certification
Test flight request	No	
RPAS characterization sheet	No	
Safety study	Yes	Risk assessment specific to the activity being conducted >20 kg
Operation manual	Yes	Flight plan for the activity being conducted
Maintenance manual	No	
Additional measures	No	
Incident notifications	No	

(continued)

Table 4 (continued)

	UK	Current regulation
	Parameters	Comments
Civil liability insurance	No	Unless commercial: operator's insurance
Requirements according to operators' origin	Yes	Professional or commercial
Special permit to operate for foreigners	Open	
<i>Requirements for pilots</i>		
Type of qualification (license)	Qualification	Drone pilot's commercial licence or >20 kg or BVLOS
Basic		Confirmation of the competencies of the pilot
Advanced	No	Special authorization depending on the activity
Practical qualification	Yes	
Requirements	No	
Flight/training hours	Yes	
Divisions according to MTOW	No	
Medical certificate	No	
Language	EN	
Radiophonist license	No	
<i>Requirements for RPASS</i>		
Identification/registration	Registration	MTOW >20 kg
Airworthiness certification	MTOW >20 kg	
Command and control link		At all times
Maintenance	No	
Test flights	No	
<i>Requirements for operation</i>		
Previous communication	Yes	Registration (commercial)
Permission	Yes	Commercial
Non-segregated airspace	Yes	Mandatory
Exceptions	No	CTR or FIZ flights are not allowed
Use of RPASs in emergency cases	Yes	Exemptions are considered in emergency cases
RPAS protection and recovery areas	No	Depending on the common
VLOS	Yes	MTOW <20 kg

(continued)

Table 4 (continued)

	UK	Current regulation
	Parameters	Comments
EVLOS		Need for special approval
BVLOS	MTOW <7 kg	
BVLOS	7 kg <MTOW >20 kg	Segregated airspace

Source Own elaboration; EASA (2017), Stöcker (2017)

- Private use: maximum higher than 10 m above a private terrain and the drone—weighing less than 1 kg—must be within line of sight at all times. These flights can only happen during daylight, and they are not allowed for commercial or professional purposes.
- Model aircraft: take-off weight between 1 and 150 kg and used only for recreational purposes above a model aircraft terrain recognized by the BCAA, as specified in the aeronautical information package (AIP). They are not allowed for commercial or professional purposes.
- Class 2 operations: not higher than around 45 m above ground outside controlled airspace and outside cities or communities. Operations can only occur in daylight conditions and the drone—weighing less than 5 kg—must remain within the pilot’s LOS at all times.
- Class 1b operations: up to around 90 m above ground outside controlled air-space. Moreover, more than 50 m clear of people and/or goods on the ground. Operations can only occur in daylight conditions and the drone—weighing less than 150 kg—must remain within LOS at all times.
- Class 1a operations: up to around 90 m above ground outside controlled air-space. Moreover, closer than 50 m to people and/or goods on the ground or even over them or around an obstacle closer than 30 m. Operations can only occur in daylight conditions and the drone—weighing less than 150 kg—must remain within line of sight at all times. All operations that are not covered in the previous categories are to be considered as Class 1a operations.

Therefore, only classes 1 and 2 can be used for commercial or professional purposes. This means:

- Registration of the drone at the BCAA;
- A certificate of competence in the case of class 2 (taking a theoretical course and passing a practical skill test with an examiner recognized by the BCAA) or a remote pilot licence in the case of class 1 (a theoretical examination organized by the BCAA and a practical skill test with an examiner recognized by the BCAA);
- An operation manual and risk assessment for class 1;

Table 5 Belgium's current regulation (commercial or professional)

	Belgium	Current regulation
	Parameters	Comments
<i>Administration and regulation</i>		
Regulatory body	BCAA	BCAA: drones less than 150 kg EASA: drones more than 150 kg
Last normative update	None	
Normative identification	Royal Decree of 10 April 2016	Drones are divided depending on their weight into class 2 (up to 5 kg) and class 1 (up to 150 kg)
<i>Limits for operation</i>		
MTOW	<150 kg	
Divisions according to MTOW	<5 kg; <150 kg	
Maximum flight height	45–90 m	
VLOS	MTOW <150 kg	
VLOS—distance to pilot	<50 m	Keeping visual contact
EVLOS	Not allowed	
BVLOS	MTOW <5 kg	Prior authorization (Class 1)
Number of RPASs piloted by the same pilot	1	Not specified
Areas of operation	Limited	Not prohibited zones, danger zones, restricted zones, temporary segregated/ reserved areas, etc.
Periods of operation	Daytime	All cases
Dangerous goods and substances shipped	No	
Flight zones	Non-controlled airspace	Safety study
Distance from airports	Yes	
<i>Requirements for the operator (Documentation)</i>		
Registration request	Yes	
Test flight request	No	
RPAS characterization sheet	No	
Safety study	Yes	Only class 1: risk assessment by the operator

(continued)

Table 5 (continued)

	Belgium	Current regulation
	Parameters	Comments
Operation manual	Yes	Only class 1: operation manual drafted by the operator
Maintenance manual	No	
Additional measures	Yes	To avoid interference
Incident notification	Yes	
Civil liability insurance	Yes	
Requirements according to operators' origin	Yes	Class 1a (certificate of conformity for the drone) Class 1b (declaration of compliance made by the operator)
Special permit to operate for foreigners	Open	
<i>Requirements for pilots</i>		
Type of qualification (license)	Qualification	
Basic (class 2)	Yes	Theoretical training + practical skill test
Advanced (class 1)	Yes	Theoretical exam + practical skill test
Practical qualification	Yes	
Requirements	Yes	16 years (class 2) or 18 years (class 1)
Flight/training hours	No	
Divisions according to MTOW	Yes	
Medical certificate	Yes	Class 1
Language	FR or NL	
Radiophonist license	No	
<i>Requirements for RPASs</i>		
Identification/registration	Yes	
	Registration	MTOW >5 kg
Airworthiness certification	MTOW >5 kg	
Command and control link		At all times
Maintenance	Yes	
Test flights	Yes	

(continued)

Table 5 (continued)

	Belgium	Current regulation
	Parameters	Comments
<i>Requirements for operation</i>		
Previous communication	Yes	Flight notification to the BCAA before start of flight (class 1)
Permission	Yes	Authorization to operate received from the BCAA (class 1a)
Non-segregated airspace	Yes	Industrial complexes, nuclear power plants, military zones, and other special zones cannot be flown over unless otherwise described in the AIP
Exceptions	No	CTR or FIZ flights are not allowed
Use of RPASs in emergency cases	Yes	Exemptions are considered in emergency cases
RPAS protection and recovery areas	No	
VLOS	Yes	MTOW < 150 kg
EVLOS		Not allowed
BVLOS	MTOW <150 kg	
BVLOS	<150 kg MTOW >5 kg	Segregated airspace

Source own elaboration and EASA (2017)

- A declaration made by the operator that the organization is in full compliance with the national requirements for class 1b (starting operations only after receiving confirmation from the BCAA and notifying the BCAA of each drone flight before take-off) and the prior authorization of the BCAA for class 1a (the drone has a certificate of conformity from the BCAA or an equivalent document issued by a civil aviation authority from an EU Member State. If not, one must be obtained prior to requesting authorization);
- Forbidden zones at all times are: all controlled airspaces, prohibited zones, danger zones, restricted zones, temporary segregated/reserved areas, and so on. Industrial complexes, nuclear power plants, military zones, and other special zones cannot be flown over unless otherwise described in the AIP.

The use of completely autonomous aircrafts, that is, unmanned drones that do not allow the pilot to intervene immediately to take control over the flight, remains strictly forbidden.

Other chapters of the Royal Decree include provisions for the communication and control software that is implemented in drone technology, incident reporting obligations, mandatory insurance coverage for drone operators, and references to compliance with the applicable data protection and privacy legislation (in particular for drones with a camera functionality).

Table 6 Comparative analysis from Tables 3, 4 and 5

Spain		Current regulation		New regulation		UK		Current regulation		Belgium		Current regulation	
Parameters		Comments		Comments		Parameters		Comments		Parameters		Comments	
Administration and regulation													
Regulatory body	AESA	AESAs: drones less than 150 kg EASAs: drones more than 150 kg		No changes		CAA		CAA: drones less than 150 kg EASA: drones more than 150 kg		BCAA		BCAA: drones less than 150 kg EASA: drones more than 150 kg	
	Law 18/2014 Section 6	Article 50 distinguishes drones less than 2 kg, less than 25 kg, and less than 150 kg				The Air Navigation Order 2016		Article 94 Differences between drones up to 7 kg and drones up to 20 kg		Royal Decree of 10 April 2016		Drones are divided into class 2 (up to 5 kg) and class 1 (up to 150 kg)	
Limits for operation													
MTOW	<25 kg			No changes		<20 kg				<150 kg			
Divisions according to MTOW				<10 kg to fly over populated areas, new regulation		<7 kg; <20 kg				<5 kg; <150 kg			
Maximum flight height	120 m			No changes		122 m				45–90 m			
VLOS	MTOW <25 kg	Keeping control of aircraft at all times from a ground control station (GCS)		No changes		MTOW <20 kg				MTOW <150 kg			
VLOS—distance to pilot	<500 m	Keeping visual contact		No changes		<500 m		Keeping visual contact		<50 m		Keeping visual contact	
EVLOS		Not allowed		MTOW <25 kg Observers within 500 m distance		Need for special approval		Special approval		Not allowed		Not allowed	

(continued)

Table 6 (continued)

	Spain		Current regulation		New regulation		UK		Current regulation		Belgium		Current regulation	
	Parameters	Comments		Comments		Comments	Parameters	Comments		Comments	Parameters	Comments		Comments
BVLOS	MTOW <2 kg	Keeping control of aircraft at all times from GCS		No changes	MTOW <7 kg		MTOW <7 kg				MTOW <5 kg			
BVLOS				MTOW <25 kg Mandatory detect and avoid (D&A) system on board or in segregated airspace							Requires authorization			Categorized as Class 1
Number of RPASs piloted by the same pilot	1			No changes	1			Not specified	1				Not specified	
Areas of operation		Non-populated areas or buildings		No changes				Non-populated areas or buildings (min. 150 m)					Not prohibited zones, danger zones, restricted zones, temporary segregated/reserved areas, etc.	
		Non-controlled airspace		Urban areas and over populated zones				Non-controlled airspace						
				Non-controlled airspace				Not closer than 50 m to any person					Not closer than 50 m to any person	
	Daytime	Always						Always			Daytime		All cases	(continued)

Table 6 (continued)

	Spain	Current regulation	New regulation	UK	Current regulation	Belgium	Current regulation
	Parameters	Comments	Comments	Parameters	Comments	Parameters	Comments
Periods of operation			Daytime-/night-time-specific safety requirement				
Dangerous goods and substances shipped	No		No changes	No		No	
Flight zones	Non-controlled airspace	Regular safety study	No changes	Non-controlled airspace	Safety study	Non-controlled airspace	Safety study
			Controlled airspace or FIZ (flight information zone)—specific safety study	Yes	Check no-fly zones (http://www.noflydrones.co.uk)	Yes	
Distance from airports	>8 km or >15 km with an instrument flight rules (IFR) system	Shorter distance is allowed when agreed and coordinated with airport management	Agreed and coordinated with airport management—specific safety study	Yes	Check	Yes	
<i>Requirements for the operator (Documentation)</i>							
Registration request	Yes	Declaration	No changes	No	Unless commercial: operator's certification	Yes	
Test flight request	Yes	Previous to definitive registration	No changes	No		No	

(continued)

Table 6 (continued)

	Spain		Current regulation		New regulation		UK		Current regulation		Belgium		Current regulation	
	Parameters	Comments	Parameters	Comments	Parameters	Comments	Parameters	Comments	Parameters	Comments	Parameters	Comments	Parameters	Comments
RPAS characterization sheet	Yes		For each RPAS	No changes	No		No		No		No			
Safety study	Yes		For each scenario	No changes	Yes		Yes		Risk assessment specific to the activity being conducted		Yes		Only class 1: risk assessment by the operator	
Operation manual	Yes			No changes	Yes		Yes		Flight plan for the activity being conducted		Yes		Only class 1: operation manual drafted by the operator	
Maintenance manual	Yes			No changes	No		No				No			
Additional measures	Yes		To avoid interference	No changes	No		No				Yes		To avoid interference	
Incident notifications	Yes		Mandatory	No changes	No		No				Yes			
Civil liability insurance	Yes		For each aircraft, €300 k min.	No changes	No		No		Unless commercial: operator's insurance		Yes			
Requirements according to operators' origin	Open			No changes	Yes		Yes		Commercial		Yes		Class 1a (certificate of conformity for the drone)	

(continued)

Table 6 (continued)

	Spain		Current regulation	New regulation	UK	Current regulation	Belgium	Current regulation
	Parameters	Comments	Comments	Comments	Parameters	Comments	Parameters	Comments
Special permit to operate for foreigners	Open	Official language competency mandatory	No changes	Open		Open		Class 1b (declaration of compliance made by the operator)
	Requirements for pilots							
Type of qualification (license)	Qualification	Not a license	No changes	Qualification	Drone pilot's commercial licence	Qualification		
Basic	50 h	VLOS—on-site and online (with 5 h on-site session) + on-site exam	No changes		Confirmation of the competencies of the pilot	Yes		Theoretical training + practical skill test (class 2)
Advanced	60 h	BVLOS—on-site and online (with 6 h on-site session) + on-site exam	No changes	No		Yes		Theoretical exam + practical skill test (class 1)
Practical qualification	For each aircraft	Specific aircraft, almost a type certificate	No changes	No		Yes		Both classes
Requirements		Onsite theoretical class 5 h + theory exam + practical exam	No changes	No		Yes		16 years (class 2) or 18 years (class 1)
(continued)								

(continued)

Table 6 (continued)

	Spain		Current regulation		New regulation		UK		Current regulation		Belgium		Current regulation	
	Parameters	Comments	Comments		Comments		Parameters		Comments		Parameters		Comments	
Flight/training hours	No		Yes >3 h in the last 3 months for each category of aircraft		No changes		No				No			
Divisions according to MTOW	<5 kg; <15 kg	To be considered as similar RPASs for qualification			No changes		No				Yes			
Medical certificate	Yes	LAPL certificate (light aircraft pilot licence) or Class 2 certificate until LPAL is in force	LPAL certificate (as for light aircrafts manned piloting certificate)				No				Yes		Class 1	
Language	ESP		No changes				EN				FR or NL			
Radiophonist license	No	Current regulation	Yes, for flights in controlled airspace				No				No			
Requirements for RPASs														
Identification/registration	Identification plate	MTOW <25 kg	No changes				No identification				Yes			
	Registration	MTOW >25 kg	No changes				Registration		MTOW >20 kg		Registration		MTOW >5 kg	
Airworthiness certification	MTOW >25 kg		No changes				MTOW >20 kg				MTOW >5 kg		MTOW >5 kg	
Command and control link		At all times	No changes						At all times				At all times	
Maintenance	Maintenance programme	Provided by the manufacturer	No changes				No				No			
Test flights	Previous	For operator registration, to demonstrate that	No changes				No				Yes			
(continued)														

(continued)

Table 6 (continued)

	Spain		Current regulation		New regulation		UK		Current regulation		Belgium		Current regulation	
	Parameters	Comments	Parameters	Comments	Parameters	Comments	Parameters	Comments	Parameters	Comments	Parameters	Comments	Parameters	Comments
<i>Requirements for operation</i>														
Previous communication	Yes		Registration	No changes			Yes		Registration (commercial)		Yes		Flight notification to the BCAA before start of flight (class 1)	
Permission	Yes		Specific and temporary for testing flights	For flights in controlled traffic regions (CTRs), BVLOS, or populated areas			Yes		Commercial		Yes		Authorization to operate received from the BCAA (class 1a)	
Non-segregated airspace	Yes		Mandatory	Mandatory but other scenarios are considered with permission			Yes		Mandatory		Yes		Industrial complexes, nuclear power plants, military zones, and other special zones cannot be flown over unless otherwise described in the AIP	
Exceptions	No		CTR or FIZ flights are not allowed	Yes CTR, FIZ, or populated areas			No		CTR or FIZ flights are not allowed		No		CTR or FIZ flights are not allowed	
Use of RPASs in emergency cases	Yes		Exemptions are considered in emergency cases	Specific exemptions are stated for operation in emergency cases			Yes		Exemptions are considered in emergency cases		Yes		Exemptions are considered in emergency cases	
RPAS protection and recovery areas	No		Not allowed	Yes R >30 m for take-off and landing			No		Depending on the common		No		Depending on the common	

(continued)

Table 6 (continued)

	Spain		Current regulation		New regulation		UK		Current regulation		Belgium		Current regulation	
	Parameters	Comments	Parameters	Comments	Parameters	Comments	Parameters	Comments	Parameters	Comments	Parameters	Comments	Parameters	Comments
VLOS	Yes	MTOW <25 kg	MTOW <25 kg	No changes			Yes	MTOW <20 kg	Yes	MTOW <150 kg			MTOW <150 kg	
EVLOS		Not allowed	Not allowed	MTOW <25 kg Observers within 500 m distance from pilot and communicated				Need for special approval		Not allowed				
BVLOS	MTOW <2 kg	Issue of notice to airmen (NOTAM)		No changes			MTOW <7 kg			MTOW <150 kg				
BVLOS	2 kg < MTOW >25 kg	Segregated airspace	Segregated airspace	With a D&A system in non-controlled airspace—without a D&A system in segregated airspace			7 kg < MTOW >20 kg	Segregated airspace		<150 kg MTOW >5 kg			Segregated airspace	

Source Own elaboration

Excluded from the regulatory requirements of the Royal Decree of 10 April 2016 are (a) drones used only to fly inside buildings (indoor); (b) drones used by the military, customs authorities, the police, coastguard, and so on; and (c) certain types of model aeroplanes solely used for personal/recreational purposes, provided that they meet the strict requirements detailed in the Royal Decree.

As our focus is on the commercial or professional use of drones, we summarize the current parameters in Table 5.

6 Comparative Analysis

See Table 6.

7 Conclusions

As we can observe in Table 6, the differences among European countries regarding the operation of drones are still relevant, diminishing the competitiveness of the European drone industry. However, the future legal framework, as designed by the EASA (2017), will create legal certainty for the industry, especially concerning drone requirements in the case of commercial and professional activities.

Furthermore, distinguishing drones depending on their risk and not on their weight could solve the problems of professionals when working in another European country. As an example, we can observe big differences between countries like Belgium, France, Poland, Spain, Sweden, and the UK, where the national authority's permission is limited to 150 kg, while other countries, such as Denmark, Finland, Lithuania, and Portugal, place the upper weight limit at 25 kg.

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