

UNMANNED VEHICLES AND SAFETY IN THE CONTEXT OF EU AND SLOVAK LEGISLATION

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ABSTRACT

The study which follows on findings from the scientific-research task named “Analysis of the use of unmanned airborne vehicles in selected Police Force services” conducted by the Academy of the Police Force in Bratislava in cooperation with the Police Force Headquarters focuses on theoretical and application contexts of selected issues in regulation of unmanned vehicles within EU. The author closely examines the newly adopted drone legislation which affects the Slovak regulation. The author points out to EU regulation, drawing attention to her own findings determined by her own scientific and pedagogical activities, and presents her explanation of elements which may be considered the core elements of unmanned vehicles legislation.

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INTRODUCTION

Aircraft able to fly without a pilot on board currently form the fastest developing sector of aviation. Naturally, EU believes that this area has a huge potential to create economic growth and new jobs. Therefore, the legislation keeps improving constantly so that unmanned vehicles may be flawlessly incorporated in the airspace. The rules which have been adopted form a basis for maintaining the economic and legal competitiveness, though they also consider any potential risks. It should be a kind of balance between progress and safety.

“One example of the new rules refers to the registration threshold for drone operators: if their drones can transfer more than 80 Joules of kinetic energy upon impact with a person then they should be registered”.¹

EASA² has issued recommendations for using drones:

“What to do:

- Keep your drone in sight at all times
- Plan your flight and choose an unobstructed site
- Get permission if you want to use your drone for paid work
- Read the manufacturer's instructions carefully”³

“What not to do:

- Do not fly in a way that endangers anyone
- Do not fly overhead or within 50 metres of people, property or vehicles
- Do not fly higher than 150 metres from the ground
 - Keep away from airports and helipads”⁴

¹ *Drony: reforma bezpečnosti letectva EÚ*, “Európska rada – Rada Európskej únie”, <https://www.consilium.europa.eu/sk/policies/drones/>

² European Aviation Safety Agency (EASA).

³ *Drony...*, *op. cit.*

⁴ *Ibidem.*

1. THE RELEVANCE OF ADOPTING RULES

The importance of adoption of similar rules is related to the diversity of unmanned vehicles – although some drones may have the size, speed or weight like passenger planes, they can also take the shape of very small toys that may be bought in any shop. It is exactly the use of small drones which triggered the effort to make the legislation more precise. After 2008, smaller drones created regulatory problems for the EU, whose competencies were limited to unmanned vehicles above 150 kilograms. Lighter and smaller drones were only subject to different and mainly inconsistent rules of individual member states which were not applied in a coherent way.

“A reform of the aviation rules was also necessary as EU air traffic is estimated to increase by 50% in the next 20 years.

The European Commission predicts that by 2035 the European drone sector will:

- directly employ more than 100,000 people;
- have an economic impact exceeding €10 billion per year, mainly in services”.⁵

According to the above-stated data, the production and use of unmanned vehicles will expand and it will be necessary to harmonize manufacturers’ and users’ requirements with the arising risks and safety, since unmanned vehicles may bring benefits in both public and private sectors. They represent an immense asset during rescue works or activities of police units or medical staff, and they have also proved beneficial in the private sphere. However, they undoubtedly also carry certain risks, posing a threat to privacy or protection of personal data, and we must also bear in mind the noise, visual obstacles and CO₂ emissions.

“On 12 March 2019, the European Commission adopted EU-wide rules setting technical requirements for drones.⁶ In line with the »EASA regulation«, the new rules lay down the basic principles for ensuring safety, security and privacy, and the protection of personal data. They also aim to reduce red tape and encourage innovation. The regulation also eliminates some rules which could stifle entrepreneurship. This is expected to bring legal certainty for an industry that includes a large number of small and medium-size enterprises, and start-ups. Moreover, the regulation intro-

⁵ *Ibidem.*

⁶ COMMISSION DELEGATED REGULATION (EU) 2019/945 on unmanned aircraft systems and on third-country operators of unmanned aircraft systems.

duces a risk- and performance-based approach to safety. This means it recognises the different risks involved in the various sectors of civil aviation. For instance, helicopters or light sport aircraft are subject to simpler and cheaper approval procedures than commercial aircraft”.⁷

2. CURRENT LEGISLATION GOVERNING UNMANNED VEHICLES IN THE SLOVAK REPUBLIC

Following up on the newly adopted European legislation, in its Decision (hereinafter referred to as the “Decision”) which entered into force on 15 November 2019 the Slovak Transport Authority issued rules governing flights with unmanned aircraft.⁸ The above-stated Decision applies to any unmanned vehicle moving in the Slovak airspace, while it also contains negative definition, i.e. what vehicles the Decision does not apply to:

- “a) kite;
- b) unmanned free balloon;⁹
- c) unmanned HALE aircraft¹⁰ owned by the Slovak Republic, administered, used or in services of the Ministry of Defence of the Slovak Republic or Armed Forces of the Slovak Republic, or owned by the North Atlantic Treaty Organization or by any member state of the North Atlantic Treaty Organization, providing that such flight is performed at flight level¹¹ 510 and above”.¹²

Such provisions apply accordingly also to flights performed in the vicinity of specific airports, as described in the Act no. 143/1998 Coll. on Civil Aviation (the Aviation Act).

Use of unmanned vehicles for performing tasks of the state for:

- armed forces;
- armed security forces;

⁷ *Drony...*, *op. cit.*

⁸ *Decision no. 2/2019 of 14 November 2019 laying down the conditions of performing flights with unmanned aircraft and banning flights of designated categories of aircraft in the airspace of the Slovak Republic.*

⁹ *Commission Implementing Regulation (EU) no. 923/2012*, as amended, article 2(138).

¹⁰ Unmanned HALE aircraft is an unmanned aircraft with long endurance flying at high altitudes (HALE – High Altitude Long Endurance).

¹¹ *Commission Implementing Regulation...*, *op. cit.*, article 2(78).

¹² *Decision no. 2/2019...*, *op. cit.*, article 1(2).

- financial administration when performing activities related to customs administration;
- rescue units of the integrated rescue system; and
- information and intelligence services

represents a separate category.

In accordance with the above-stated Decision, they are governed by Article 5 which lays down general conditions for performing flights as well as Article 9.

The following terms and definitions form an important part of the examined Decision:

- a) autonomous aircraft – unmanned vehicle intended for flying which is equipped with an autonomous control system and does not allow human intervention in the control during the flight;
- b) remotely piloted aircraft – unmanned aircraft controlled remotely by the pilot from a remote pilot station which is not located on board of the aircraft;
- c) model aircraft – model aircraft pursuant to a special regulation, with or without an engine, which is not equipped with equipment enabling automatic flight to a designated place, is remotely controlled by the pilot throughout the flight by means of a remote pilot station and which the pilot maintains visual line-of-sight with remotely;
- d) unmanned aircraft flight – any activity of unmanned aircraft from setting in motion until completing the final stop;
- e) automatic flight – form of performing flights with unmanned aircraft during which the unmanned aircraft performs previously determined manoeuvres or flight tasks independently, while the pilot may remotely intervene in the control of the unmanned aircraft at any moment;
- f) unmanned aircraft operator – person who uses the unmanned aircraft as an owner or on a different legal base and who is responsible for its safe operation;
- g) unmanned aircraft class C0 – remotely piloted aircraft or model aircraft with maximum take-off mass not exceeding 250 g;
- h) unmanned aircraft class C1 – remotely piloted aircraft or model aircraft with maximum take-off mass higher than 250 g but lower than 900 g;
- i) unmanned aircraft class C2 – remotely piloted aircraft or model aircraft with maximum take-off mass higher than 900 g but lower than 4 kg;

- j) unmanned aircraft class C3 – remotely piloted aircraft with maximum take-off mass higher than 4 kg but lower than 25 kg and with a typical size smaller than 3 m;
- k) unmanned aircraft class C4 – model aircraft with maximum take-off mass higher than 4 kg but lower than 25 kg;
- l) remotely piloted aircraft system – system consisting of a remote pilot station, at least one remotely piloted aircraft or aircraft model and any other element necessary for performing a flight, particularly a command and control link and communication link;
- m) command and control link – C2 link – data link between a remotely piloted aircraft or model aircraft and a remote pilot station for the purpose of performing a flight;
- n) remote pilot station – station which is a part of a remotely piloted aircraft system and which contains equipment necessary for controlling the flight of a remotely piloted aircraft or model aircraft and through which the pilot remotely controls the flight of a remotely piloted aircraft or model aircraft;
- o) visual line-of-sight (VLOS) – direct visual contact between the pilot of a remotely piloted unmanned aircraft and the unmanned aircraft without using other visual aids than spectacles or contact lenses;
- p) »detect and avoid« – the capability to see, sense or detect conflicting traffic or other hazards and take the appropriate action to avert a collision and to ensure the safety of air traffic”.¹³

Since the Transport Authority issues permissions for performing flights with unmanned vehicles, it is necessary that applicants demonstrate a set of practical and theoretical skills in order to ensure qualified operation and comprehensive safety during flights with the unmanned vehicles. Unmanned vehicles of category B need to be registered and flight permissions need to be issued for them.

3. CONDITIONS FOR PERFORMING FLIGHTS WITH UNMANNED VEHICLES

With the exception of flights governed by a special legal regulation, drone flights may be performed only if basic conditions have been met. The pilot cannot be under the influence of any psychoactive substance and the drone may fly in an uncontrolled airspace at maximum altitude of 120 metres.

¹³ *Ibidem*, article 2.

The vehicle cannot be equipped with a pulsejet or rocket engine, while a rocket engine necessary for the vehicle to take-off is allowed. Flights need to be performed in such a manner as not to jeopardize:

- a) safety of other aircraft;
- b) safety of persons;
- c) property;
- d) environment (e.g. by excessive noise, pollutants, excessive emissions, etc.).

During the flight the pilot needs to maintain a constant visual line-of-sight with the drone; as I have already mentioned, the pilot is obliged to follow the “detect and avoid”¹⁴ principle. If a non-standard situation occurs during the flight, the pilot is obliged to finish the flight immediately and safely.

Unmanned vehicles cannot be used for¹⁵:

- a) spraying chemical substances;
- b) business air transport;
- c) dropping objects, unless aerial work is performed (aerial work may be performed with a permission of the Transport Authority).

Before the flight, the unmanned vehicle pilot needs to take into consideration and perform the flight with regard to:

- a) operating conditions of the unmanned vehicle;
- b) meteorological conditions in the area where the flight is going to be performed;
- c) place, time and space where the flight is going to be performed;
- d) safe operation and drone manufacturer’s instructions;
- e) emergency and flight procedures specified by the manufacturer;
- f) airworthiness, operational restrictions and technical restrictions of the product.

“Unless specific tasks are performed, it is forbidden to perform flights in the night. Unmanned aircraft classes C0 to C4 and unmanned aircraft with maximum take-off mass 25 kg and above shall be fitted with a backup radio and control system which will enable to perform forced

¹⁴ *Ibidem*, article 5(7).

¹⁵ *Ibidem*, article 5(9) and (10).

landing safely in the case of any malfunction or failure of any part of the remotely piloted aircraft system, particularly flight control and management means, including command and control link or, if it is impossible due to the structure of the unmanned aircraft, it shall be equipped with an independent backup safety system which will shut down the engine and bring the controls or other aircraft control units into a pre-defined, usually extreme position; this shall not apply to unmanned aircraft systems classes C0 to C4 pursuant to a special regulation”.¹⁶

4. OPERATION CATEGORIES

Flights with unmanned vehicles from the category A may be performed without a prior approval. Conditions for performing flights with unmanned vehicles from sub-category A1:

- a) the above-stated general conditions shall be complied with;
- b) the flight shall not be performed above assemblies of people;
- c) the flight may be performed only when the visibility and meteorological conditions are appropriate;
- d) drone class C0 or C1 shall be used;
- e) VLOS, i.e. visual line-of-sight shall be constantly maintained with the drone;
- f) horizontal distance between the unmanned vehicle and the pilot who remotely pilots it shall not be more than 1,000 metres;
- g) the flight shall be performed in the “controlled traffic region (CTR) without coordination with the particular air traffic control unit:
 - (1) in the distance of at least 3.7 km (2 NM) from the airport reference point (ARP); and
 - (2) up to the altitude of 30 m (100 ft) above ground level (AGL)”;¹⁷
- h) if the pilot wants to use the follow-me mode¹⁸, they may do so only up to 30 metres above ground, in the distance of up to 30 metres from the pilot and providing that the follow-me mode enables the pilot to finish such flight and to take over the control.

Conditions for performing flights with unmanned vehicles from sub-category A2:

¹⁶ *Ibidem*, article 5(17).

¹⁷ *Ibidem*, article 6(1).

¹⁸ Follow-me mode.

- a) the above-stated general conditions shall be complied with;
- b) distance of at least 50 metres from assemblies of people shall be maintained; the above-stated is not necessary if a prior agreement has been made and if sufficient safety measures are in place;
- c) visibility and meteorological conditions are appropriate to enable a safe flight;
- d) drone class C2 shall be used;
- e) VLOS, i.e. visual line-of-sight shall be constantly maintained with the drone;
- f) horizontal distance between the unmanned vehicle and the pilot who remotely pilots it shall not be more than 1000 metres;
- g) the flight shall be performed in the “controlled traffic region (CTR) without coordination with the particular air traffic control unit:
 - (1) in the distance of at least 3.7 km (2 NM) from the airport reference point (ARP); and
 - (2) up to the altitude of 30 m (100 ft) above ground level (AGL)”;¹⁹
- h) the flight shall not be performed above populated areas of towns, municipalities, assemblies of people, protection zones, protected territories, etc.

Conditions for performing flights with unmanned vehicles from sub-category A3:

- a) the above-stated general conditions shall be complied with;
- b) appropriate distance from people shall be maintained so that they are not exposed to excessive noise, depending on the power and propulsion of the unmanned vehicle. People shall not be jeopardized if any unusual situation occurs. In any case the flight shall be performed at least 50 metres from assemblies of people; the above-stated is not necessary if a prior agreement has been made and if sufficient safety measures are in place;
- c) visibility and meteorological conditions are appropriate to enable a safe flight;
- d) drone class C3 or C4 shall be used;
- e) VLOS, i.e. visual line-of-sight shall be constantly maintained with the drone;

¹⁹ *Decision no. 2/2019...*, *op. cit.*, Article 6(2).

- f) horizontal distance between the unmanned vehicle and the pilot who remotely pilots it shall not be more than 1000 metres;
- g) the flight shall be performed in the “controlled traffic region (CTR) without coordination with the particular air traffic control unit:
 - (1) in the distance of at least 5.6 km (3 NM) from the airport reference point (ARP); and
 - (2) up to the altitude of 30 m (100 ft) above ground level (AGL);²⁰
- h) the flight shall not be performed above populated areas of towns, municipalities, assemblies of people, protection zones, protected territories, etc.;
- i) operators of unmanned vehicles with take-off mass 20 kilogrammes and above shall take out a liability insurance policy covering liability for any damage caused by operation of the unmanned vehicle to any third party.

Conditions for performing flights with unmanned vehicles from sub-category B:

- a) the above-stated general conditions shall be complied with;
- b) after the Transport Authority has approved the determined conditions, if the flight with an unmanned vehicle is going to be performed otherwise than specified for the operating category A, namely if the flight is going to be performed:
 - 1. during the night, if the drone has sufficient lighting;
 - 2. with a drone with maximum take-off mass over 25 kilogrammes;
 - 3. in a controlled airspace, if the flight with the unmanned vehicle is coordinated with the particular air traffic control unit;
 - 4. in other distance from persons than determined for drones from the operating category A;
- c) providing that the drone operator:
 - 1. has and regularly keeps a drone logbook or a similar document;
 - 2. has taken out and performs a liability insurance policy covering liability for any damage caused by operation of the unmanned vehicle to any third party (the operator is obliged to demonstrate it on request of the Transport Authority);
- d) providing that the drone pilot:
 - 1. has a license to pilot the unmanned vehicle;

²⁰ *Ibidem*, article 6(3).

2. has the permission and approval of the Transport Authority with them during the flight;
 3. after the end of the flight with the unmanned vehicle they shall record information about the flight in the logbook (or a similar alternative document), namely: pilot's name and surname, flight date, "registration mark, take-off site and time, landing site and time, total flight time, type of flight activities, description of malfunctions, failures or occurrences which had an impact on the airworthiness and safe operation of the remotely piloted aircraft or remotely piloted model aircraft";²¹
- e) the unmanned vehicle shall be registered.

The operator is obliged to file a request for performing the flight to the Transport Authority at least 30 days before the flight. The request shall contain:

- a) purpose of the flight with the unmanned aircraft;
- b) form of performance of the flight with the unmanned aircraft;
- c) geographical features of the area where the flight with the unmanned aircraft is going to be performed;
- d) level of threat to property and health of persons on the ground which may be caused by the flight with the unmanned aircraft;
- e) class of the airspace where the flight with the unmanned aircraft is going to be performed;
- f) class, structure, performances and safety systems of the used unmanned aircraft;
- g) organizational arrangements of the flight with the unmanned aircraft and proposed risk mitigation measures".²²

Before it grants its approval, the Transport Authority shall assess the risk caused by the flight, taking into account the proposed risk elimination measures. When performing aerial work, the holder of the permission need not have an approval of the Transport Authority but they shall prepare an analysis of risks related to performance of the flight and make it available on request. One of their primary obligations is to take steps aimed at eliminating all potential threats to people, air traffic and property.

²¹ *Ibidem*, article 8(1).

²² *Ibidem*, article 8(2).

5. COORDINATION IN CONTROLLED AIRSPACES

“Pursuant to the Article 8(1) (b), section 2, coordination with the particular air traffic control unit shall be understood as follows”²³:

- a) when performing a flight in a controlled airspace, the operator of an unmanned vehicle shall deliver a request for permission to perform the flight to the particular air traffic control unit by e-mail at least 24 hours in advance;
- b) immediately before the scheduled take-off (approximately 15 minutes), they shall contact the air traffic control unit by telephone and ask for a clearance to perform the flight. If necessary, the air traffic control unit shall be authorized to determine a different space, maximum altitude, or take-off or landing site and time;
- c) the air traffic control unit shall be notified immediately of the end, any change, discontinuation or other activities immediately related to the flight of the unmanned vehicle;
- d) the pilot shall constantly follow the instruction of the unit which may involve discontinuation, restriction or termination of the flight, be it due to time, location or altitude;
- e) the pilot is obliged to immediately report any unusual situation.

The submitted request shall contain all mandatory particulars:

- a) identification of the controlled airspace;
- b) identification of the pilot who is going to perform the flight, i.e. their name and surname;
- c) confirmation of registration of the unmanned vehicle and its registration number;
- d) maximum take-off mass and class;
- e) expected take-off time;
- f) expected landing time;
- g) delineation of the airspace where the flight is expected to be performed, including visual documentation which will indicate the movement area of the unmanned vehicle;
- h) maximum requested flight altitude;
- i) during the flight the pilot needs to be constantly reachable by the unit, while the pilot shall state two telephone numbers.

²³ *Ibidem*, article 9(1).

If the flight is performed in order to perform tasks, its coordination is the subject of agreement between the state administration authority which would like to perform the tasks and the flight operation service.

6. PERFORMING FLIGHTS WITH UNMANNED VEHICLES WITH MAXIMUM TAKE-OFF MASS OVER 25 KILOGRAMMES

Flights with model unmanned vehicles with maximum take-off mass higher than 25 kilogrammes but lower than 150 kilogrammes may be performed during the day:

- a) with a prior approval of the Transport Authority;
- b) without a prior approval, while the following shall be complied with:
 1. the above-stated general conditions shall be complied with
 2. appropriate distance from people shall be maintained so that they are not exposed to excessive noise, depending on the power and propulsion of the unmanned vehicle. People shall not be jeopardized if any unusual situation occurs. In any case the flight shall be performed at least 50 metres from assemblies of people; the above-stated is not necessary if a prior agreement has been made and if sufficient safety measures are in place;
 3. visibility and meteorological conditions are appropriate to enable a safe flight;
 4. drone class C3 or C4 shall be used;
 5. VLOS, i.e. visual line-of-sight shall be constantly maintained with the drone;
 6. horizontal distance between the unmanned vehicle and the pilot who remotely pilots it shall not be more than 1000 metres;
 7. the flight shall be performed in the “controlled traffic region (CTR) without coordination with the particular air traffic control unit:
 - (1) in the distance of at least 5.6 km (3 NM) from the airport reference point (ARP); and
 - (2) up to the altitude of 30 m (100 ft) above ground level (AGL);²⁴
 8. the flight shall not be performed above populated areas of towns, municipalities, assemblies of people, protection zones, protected territories, etc.;
 9. operators of unmanned vehicles with take-off mass 20 kilogrammes and above shall take out a liability insurance policy covering liability

²⁴ *Ibidem*, article 6(3).

for any damage caused by operation of the unmanned vehicle to any third party

10. the pilot performing the flight is authorized to pilot the unmanned vehicle based on a permission of the Transport Authority or a similar document issued by a competent EU authority;

11. the unmanned vehicle is registered in the unmanned aircraft register or in any other similar list of any EU member state.

Flights with remotely piloted unmanned vehicles with maximum take-off mass higher than 25 kilogrammes but lower than 150 kilogrammes may be performed:

- a) 1. during the night, if the drone has sufficient lighting;
2. with a drone with maximum take-off mass over 25 kilogrammes;
3. in a controlled airspace, if the flight with the unmanned vehicle is coordinated with the particular air traffic control unit;
4. in other distance from persons than determined for drones from the operating category A;

or:

- b) with a valid permission for performing aerial work.

CONCLUSION

Drones have become crucial to the success of businesses and organizations, helping certain industries advance and objectively broadening the options of companies when expanding relevant markets. “They are used in security on a global scale for their ability to record and perceive places and events in ways that would be impossible for humans”.²⁵ The history of unmanned vehicles is full of complicated developments and unexpected setbacks, but it is undeniable that they allow humans to access perspectives that would otherwise be impossible. They accomplish this with a minimal amount of effort and manpower, allowing individuals and businesses to optimize their effort without wasting energy and time. However, the above-stated benefits need to be a subject of sensitive regulation at both European and national level, to which accelerated scientific production may undoubtedly contribute.

²⁵ Friedman J., *History of Drones – Facts that You Need to Know About Drones*, “FPV Drone Reviews”, 12 February 2019, <https://fpvdronereviews.com/guides/history-of-drones/>

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