



SAFETY & SECURTIY

DRONE PILOT COURSE

HUMAN FACTORS

The human factor is one of the main limitations and aspects to take into account before making a flight. Human factors can be divided into:

- Influence of health status and psychoactive substances on the remote pilot (I'M SAFE methodology)
- Human perception

Influence of psychoactive substances or alcohol or when the remote pilot is not fit to perform his tasks

- The following elements may influence the behavior and capabilities to operate an unmanned aircraft by the remote pilot, "I'M SAFE" methodology:

✓ I'M SAFE CHECKLIST

Illness—Do I have any symptoms?

Medication—Have I been taking prescription or over-the-counter drugs?

Stress—Am I under psychological pressure from the job? Worried about financial matters, health problems, or family discord?

Alcohol—Have I been drinking within 8 hours?
Within 24 hours?

Fatigue—Am I tired and not adequately rested?

Emotion—Am I angry, depressed, or anxious?



HUMAN FACTORS

ILLNESS (I)

Colds, allergies or other common illnesses can cause discomfort in the remote pilot, such as eye irritation or headache, which can end up affecting the safety of the flight. The pilot must assess his physical fitness prior to the flight, and will only do so if he considers that he is in optimal enough condition to ensure that the illness will not affect the safety of the operation.

MEDICATION (M)

In those situations where the remote pilot is sick, the usual solution is medication. For these situations where medication is necessary, the remote pilot must assess whether the medication taken may cause any type of mental or physical impairment that may interfere with the safety of the flight.

STRESS (S)

A small level of stress can be positive for the remote pilot when flying, as it keeps him alert to risky situations. However, a high level of stress can affect behavior and ability to react. The remote pilot must be able to recognize and assess his maximum acceptable level of stress and not exceed it during flights. There are three types of stress:

- Physiological stress: This stress is related to the physique of the remote pilot. It is related to physical fatigue, which can be caused, for example, by doing a previous exercise, being out of shape or jet lag.
- Stress produced by the environment: Produced by everything that surrounds us. It can include high or low temperatures, excessive noise or inadequate oxygen level.
- Psychological stress: It is the stress produced by anxiety, mental fatigue or emotional and social factors.

HUMAN FACTORS

ALCOHOL (A)

Obviously the consumption of alcohol and/or psychoactive substances do not go well with UAS flights. The consumption of these substances affects the brain, sight, auditory system, psychomotricity and the pilot's judgment; all of them completely necessary for the realization of a safe flight.

FATIGUE (F)

Fatigue is a difficult element to control, since it affects each person differently, therefore, each pilot is responsible for knowing their fatigue limitations and never exceeding them before or during a flight. Elements that can affect pilot fatigue are, for example, lack of sleep, time changes, jet lag or night operations.

EMOTIONS (E)

The remote pilot must ask himself if the mental state he is in before making the flight is stable. Emotions can be controlled most of the time, but they can also easily resurface, especially under stressful situations.

HUMAN FACTORS

PERCEPTION

Ability of the human being to interpret the stimuli received through the senses and form a physical impression of their environment.

- Limited and can be wrong.
- When operating a UAS it is important to be aware of:
 - Limitations of human perception
 - Factors influencing perception

Factors that can affect the visual range of the unmanned aircraft (VLOS mode):

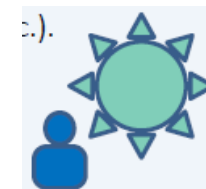
WEATHER CONDITIONS

In situations where weather conditions are adverse or unfavorable, the remote pilot's cognitive perception can be affected. (Examples: Fog, rain, snow, etc.).



BRIGHTNESS

In situations in which the lack of light or excess light can affect the pilot's vision (Examples: Flying with the sun facing, flights at dusk or dawn in which there is little light, etc.).



HUMAN FACTORS

CONTRAST

Those cases in which, due to the color of the UAS, it is similar to the tonalities of the environment where the flight takes place can make it difficult to see it during the flight. (Example: A UAS with a blue color similar to the color of the sky, is more difficult to see when flying, since it could be confused with the color of the sky, etc.).



TERRAIN SURFACE

In those cases in which the surface of the terrain where the flight is going to take place has unevenness, this must be taken into account since the UAS can be lost from sight behind the terrain. (Example: When making flights on a mountainside and wanting to obtain images of the other side of the mountain, the UAS may lose sight of it, etc.).



VISUAL AIDS

UAS that have systems such as lights or reflective materials that make it easier for remote pilots to see them.



UAS SIZE

Larger or bulkier UASs are more easily visible to the remote pilot than smaller UASs.



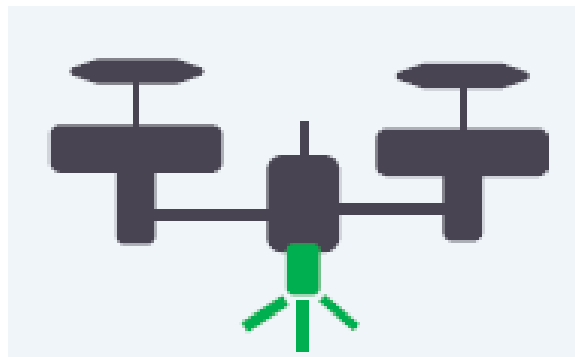
HUMAN FACTORS

LIMITATIONS OF HUMAN PERCEPTION

Since during the flight the remote pilot is on the ground and at a considerable distance from the UAS, he must be aware that he does not have a correct perception of:

- The distance between the UAS and an obstacle, or the distance between obstacles.
- The speed at which the UAS flies.
- The exact height at which the UAS is located.

All these precautions must be even greater in case of night flights, since due to the little or no visibility, human perception is much lower, and therefore, the risk of the operation increases. In order to try to reduce this risk and increase the visual perception of the pilot and, in this way, be able to distinguish the UA from a manned aircraft, on night flights from July 1, 2022, it will be mandatory for the UA to be equipped with at least one flashing green light.



PRIVACY & DATA PROTECTION

PRIVACY

In Europe, privacy is recognized as one of the human rights, which means that we all have a basic right to privacy. The basic right to privacy is the physical limitations within which an individual operates. These limitations include home, personal relationships (family and friends), and certain selected information fields (personal, sensitive or embarrassing information).

!!! ANY INTRUSION INTO PRIVACY IS ILLEGAL !!!

DATA PROTECTION

Within privacy, data protection aims to protect personal information. When we talk about personal information we mean any information (including images and audio) about an identified or identifiable natural person.

- Identified: One that can be identified directly (example: face) or indirectly (examples: car license plate, location, etc.)
- Identifiable: One that can be identified through data such as identification number, location, online identification or through physical, psychological, genetic, mental, economic or cultural factors.

PRIVACY & DATA PROTECTION

The General Data Protection Regulation (RGPD): It is the European Regulation regarding the Protection of natural persons with regard to the processing of personal data and the free circulation of these data. On the website of the Spanish Data Protection Agency (AEPD), a drone and data protection guide can be downloaded as additional resources

<https://www.aepd.es/sites/default/files/2019-09/guiadrones.pdf>



PRIVACY & DATA PROTECTION

When you fly with a UAS that has a device capable of capturing an individual's personal information, care must be taken not to violate the privacy of other people.

The main capabilities that a UAS can have related to the capture of personal information are:

- Cameras.
- Microphones.



The degree of impact of the use of a UAS on the privacy of individuals not only depends on the data capture capabilities of the UAS but also depends on:

- The purpose of the remote pilot operating the UAS.
- The extent and type of personal information that is captured.
- How this personal information is used/processed.
- Who is flying the UAS.
- The context and location of the UAS.



PRIVACY & DATA PROTECTION

Can a person be recorded or photographed in their private life?

Unless express permission of the individual is NOT allowed. Refrain from recording or taking pictures of people who can be identified without their permission.

Can you take pictures of people in public areas?

Unless express permission of the individual is NOT allowed. The right to privacy can also be applied in public areas, where a person can have a certain degree of privacy. This means that a person can appear as part of a photo captured with the UAS, but must not be the target of the photo (via zoom or directional microphones).

Can a video or image sequence be recorded in a public place with people?

In general yes. There would be no problem for a brief and inadvertent capture or appearance in a video of a person outside the operation in a public place, on the other hand, it would not be allowed if said recording consists of the systematic and permanent monitoring of a person making him the target.



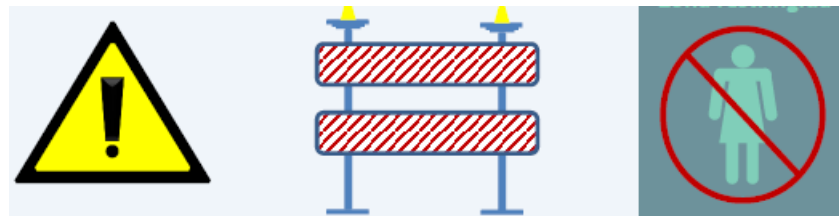
UAS SAFETY

UNLAWFUL INTERFERENCE

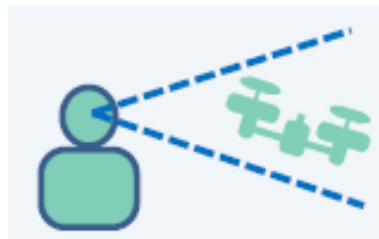
An act of unlawful interference is defined as any attempt(s) or action(s) intended to compromise the security of aircraft and/or airport facilities. In the case of UAS operations, the most common examples will be the theft or hijacking of the unmanned aircraft.

To avoid acts of unlawful interference (theft or hijacking) on the unmanned aircraft, it is recommended that:

- There is guarded, bounded and restricted access control on the ground in the area where the UAS is being operated to avoid suspicious actions in the vicinity of the aircraft and remote pilots.



- There is a person responsible for their surveillance at all times.



UAS SAFETY

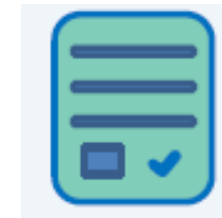
TRANSPORT

During the transport of the aircraft to the area of operations, it is recommended that they travel in luggage prepared specifically for their transport and safety.



STORAGE

The custody and storage of the UAS and its equipment, including batteries, is the responsibility of the remote pilot.



PREVENTION MEASURES

To prevent the hijacking of the aircraft through the deliberate interference of the signals used to control the aircraft, it is recommended to have prevention measures such as signal encryption systems.

- FHSS PROTOCOL: Frequency Hopping Spread Spectrum is a spread spectrum modulation technique in which the signal is broadcast over a series of apparently random radio frequencies, hopping from frequency to frequency synchronously with the transmitter, to prevent acts of deliberate interference from the signal between transmitter (transmitter) and receiver (aircraft).



UAS SAFETY

PRECAUTIONS TO BE TAKEN INTO ACCOUNT BY THE REMOTE PILOT



- Payload: Before starting each flight, check that the payload of the UAS is set correctly and the movements are correct.
- Motors and propellers: The propellers and rotors can cause serious injuries to people if they come into contact with them during their operation, so it is recommended to maintain a safety distance from the UAS when starting and stopping the operation. the engines.
- Personal equipment: The remote pilot is recommended to protect the most vulnerable parts of the body against possible injuries caused by the propellers.

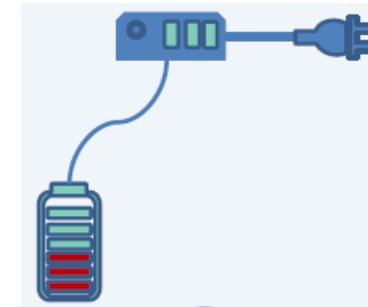


UAS SAFETY

PRECAUTIONS TO BE TAKEN INTO ACCOUNT BY THE REMOTE PILOT



- Batteries: Batteries are a very sensitive element and their misuse, charging or storage can cause serious consequences. Some recommendations for batteries are:
 - During charging:
 - Use only the specific chargers.
 - Monitor the battery in the charging process.
 - Do not charge near flammable materials.
 - Do not charge swollen, damaged or damaged batteries.
 - Do not overcharge batteries.
 - Transport:
 - Keep in the range of temperatures indicated by the manufacturer.
 - Use suitable bags for transport (fireproof).
 - Storage:
 - Store in metal/ceramic container or fireproof bag.
 - Keep in the range of temperatures indicated by the manufacturer.
 - Away from sources of heat and fire.
 - Never store completely discharged, always partially charged (approximately 30%).



INSURANCE

UAS operators and remote pilots must ensure that they are adequately informed about applicable Union and national rules/regulations related to the operations planned according to the Member State where they are going to operate, within which civil liability insurance is included. for UAS operations.



In the European Union, as a generic requirement, civil liability insurance will be required when the unmanned aircraft exceeds 20 kg of MTOM (maximum take-off mass).

MTOM > 20KG → INSURANCE !!!

INSURANCE

For those unmanned aircraft with a maximum takeoff mass of less than 20 kg, Member States may require the insurance they deem appropriate through national legislation.

In the case of Spain, during a transitory period until the publication of the UAS Royal Decree:

- UAS operators that carry out specialized operations or experimental flights with UAS must have an insurance policy that covers civil liability against third parties for damages that may be caused during the operation, in accordance with article 26 of Royal Decree 1036/2017.
- UAS operators who carry out operations exclusively for sports, recreational, competition and exhibition activities, as well as the leisure activities of toy aircraft, must have an insurance policy for damages to third parties in accordance with articles 11 and 127 of the Air Navigation Law.

MTOM < 20KG (in Spain) → INSURANCE !!!

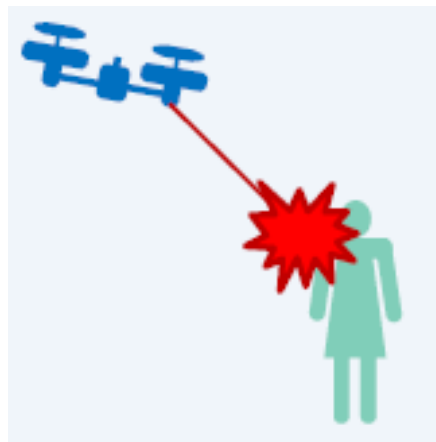
ACCIDENTS AND INCIDENTS

The operator or remote pilot will be responsible in the event of an accident or incident.

ACCIDENT

Any event that, in relation to the use of an aircraft, takes place, in the case of unmanned aircraft, in the period between the moment the aircraft is ready to start moving with the intention of making a flight and the time it stops at the end of the flight and the engines used as the primary source of propulsion are turned off, and during which:

- A person suffers fatal or serious injury as a result of coming into direct contact with any part of the aircraft.
 - Serious Injury: Any injury sustained by a person in an accident resulting in hospitalization, broken bones, lacerations, organ damage, or burns.
 - Fatal Injury: Any injury sustained by a person in an accident that results in his or her death within 30 days from the date of the accident.



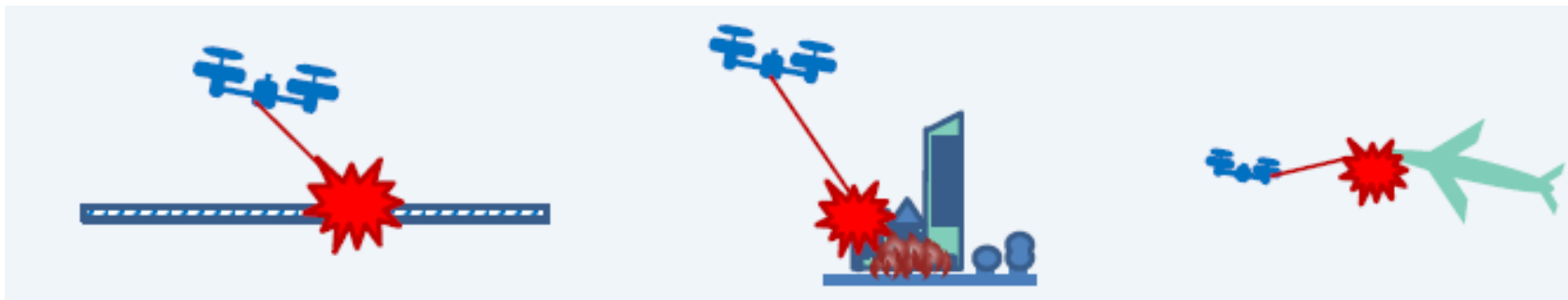
ACCIDENTS AND INCIDENTS

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INCIDENT

Any event related to the use of an aircraft, other than an accident, that affects or may affect the safety of its use.

- Serious incident: Any incident that is related to the use of an aircraft and in which circumstances indicate a high probability of an accident occurring.
 - Characteristic examples of incidents that could be serious: Near-collision requiring an avoidance maneuver to avoid the collision; Impact against the ground without loss of control; Fire or smoke produced in any element of the UAS, etc.



In the event of an accident or serious incident, it will be communicated as soon as possible to:

www.aviationreporting.eu



Thanks for your attention

DRONE PILOT COURSE