



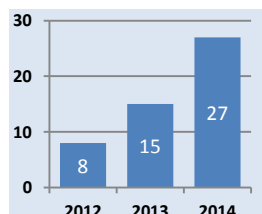
ABL Information Sheet

Incidents involving drones

This information sheet deals with reports of incidents involving remotely piloted, unmanned aerial vehicles or unmanned aircraft, commonly known as “drones”. Their official name – given by the International Civil Aviation Organization (ICAO) – is Remotely Piloted Aircraft Systems (RPAS). With this term, the relationship between the aircraft and the pilot responsible for its safe operation in flight is expressed. In accordance with international agreements, the Netherlands distinguishes two types of use: recreational and professional. The first applies to model aircraft not exceeding 25kg; the second to remotely piloted aircraft not exceeding 150 kg (RPAS). At the end of this information sheet, there is an appendix with a number of practical tips for people who fly drones.

Reports of incidents

In the past three years, the number of reported incidents involving an RPAS or a model aircraft has shown an increasing trend. Most of the reports originated from the crews of manned aircraft; others were from the RPAS operators.



Reports of incidents

Two serious incidents (near misses) involved model aircraft (in 2013 and 2014).

Professional use: RPAS

Under the regulation for flying model aircraft, the professional use of RPAS is forbidden, unless the Human Environment and Transport Inspectorate has granted an exemption. As from 1 July 2015, new rules will make it compulsory for companies to have a permit.

Companies and exemptions

In 2014, 13 companies had a commercial exemption. At the start of 2015, 13 applications for commercial exemptions were being processed. While awaiting exemption, a company can apply for exemption for individual projects. In 2014, 174 project exemptions were granted for activities such as aerial photography and industrial inspections.

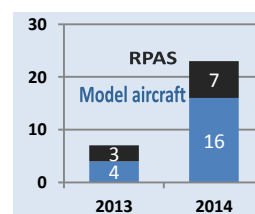
Recreational use: model aircraft

If a drone is used for recreational purposes, it is considered a model aircraft. Anybody can fly one, providing they adhere to the regulations for such aircraft.

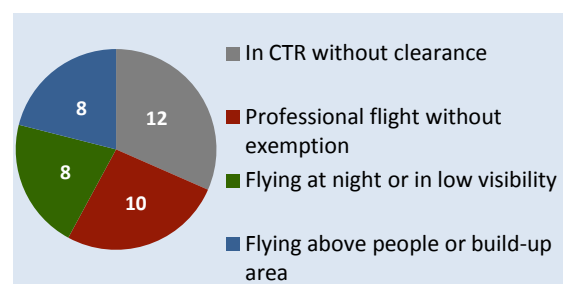
Enforcement

Since 1 July 2013, enforcement of the regulations for model aircraft has been easier (less complicated). The police can book operators of a model aircraft or RPAS if they

fail to obey the rules. The number of fines for violations involving model aircraft is substantially greater than for RPAS. The police reports show the violations that were committed, with some reports including more than one.



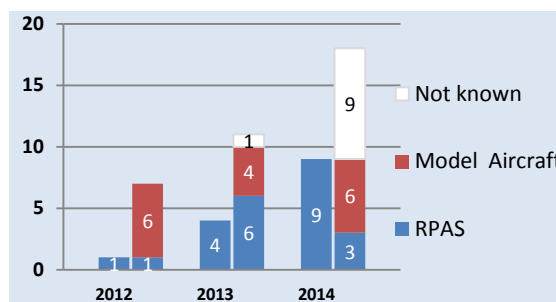
Police reports



Types of violations involving use of drones

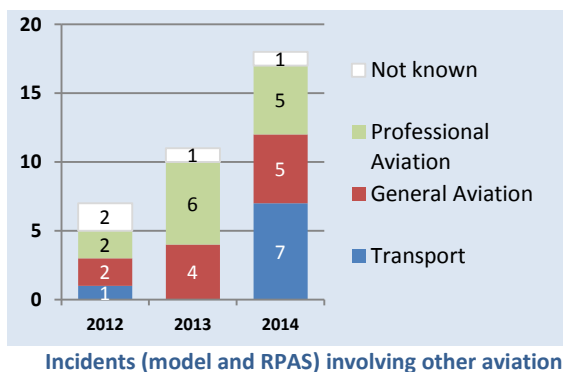
One-sided and two-sided incidents

Incidents reported to the Inspectorate are assigned to one of two broad categories: one-sided incidents, which involve only an RPAS or a model aircraft; and two-sided incidents, which involve one of the aforementioned, plus another aircraft.



One-sided (left) and Two-sided (right) incidents

Of the 36 two-sided incidents, 27 were reported by the crews of manned aircraft and 9 by RPAS operators. For reports concerning two-sided incidents (involving a model aircraft or RPAS), a note was made of the type of manned aircraft involved. Regarding such incidents, a distinction is made between general aviation¹, professional low-flying air traffic (police helicopters, HEMS and military), and public air transport. Most of the incidents reported concern general aviation or low flying, professional air traffic. Eight cases relate to commercial air transport. In these cases, the likelihood is very high that the unmanned aerial vehicles were model aircraft.



Safety zone

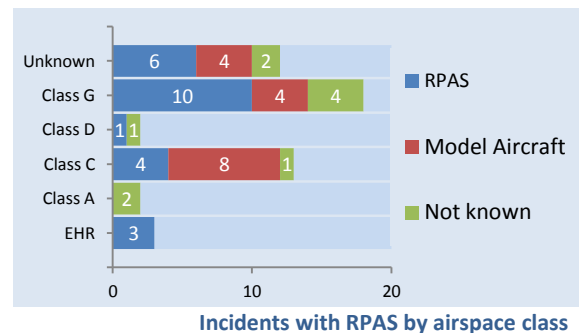
For RPAS, the numbers of one-sided and two-sided incidents grew by roughly the same amount during the reporting period. In 11 of the 13 one-sided incidents in 2013 and 2014 combined, an uncontrolled landing occurred, with considerable damage to the operator's aircraft in 9 cases. All the incidents concerned companies that had an exemption. According to the individuals who reported the incidents, almost all occurred within the safety zone (150 metres away from people, roads and buildings). It appears, therefore, that this zone is necessary as well as adequate.

Location in airspace

The reports show that most incidents involving RPAS occur in airspace class G (where there is VFR as well as IFR traffic, and permission from air traffic control is not required). Class A, B, C and D airspace is controlled by an air traffic control unit. Incidents in these classes of airspace are usually interactions with other air traffic, including commercial aviation. In class C and D airspace (in the Netherlands used for

¹ All civil aviation excluding commercial passenger and freight traffic, but including air traffic for a specific purpose, such as agriculture, construction, surveying, photography, or emergency services.

controlled zones or CTRs), miscommunication and pilot misconceptions about the function of air traffic control are also among the causes. (This applies to RPAS as well as manned aircraft). If VFR traffic – which



includes RPAS and model aircraft – is known to be present, air traffic control is responsible for providing it with information. Illegally operated RPAS or model aircraft are a threat to all air traffic.

Use of class G airspace

From the interaction incidents in class G airspace, it is clear that not all private pilots realize that model aircraft are allowed to fly in this airspace at heights up to 300 metres (1000 feet AGL) above ground or water². There have also been reports about people in an airplane or helicopter approaching an RPAS out of curiosity to observe the activity announced in a NOTAM. Not only does this interfere with the RPAS activity, because the RPAS has to give way to the manned aircraft, but it also creates unnecessary risks.

Military area

The incidents in EHR areas (where restrictions apply to civilian aircraft because of military activities) are due to unauthorized entry into the airspace of such areas where operations with military RPAS, manned aircraft or guns may be taking place.

Conclusions

Model aircraft

Reports of incidents involving model aircraft only originate from third parties, the reason being that no reporting obligation exists regarding unmanned aircraft used for recreational purposes. In reality, therefore, the number of incidents is probably much higher than the figures given in this information sheet.

² Since July 1, 2015 outside model aircraft fields connected to one of the two national associations for RC flights, the maximum height for recreational RC flights including recreational drones is 120 m AGL.

RPAS

- Relatively many hard landings and crash landings occur involving companies with an exemption. With one exception, these incidents are reported to have occurred inside the compulsory safety zone, where no people or traffic are allowed. A valid conclusion from this is that designating a safety zone is essential.
- The general perception that manned aircraft almost never fly close above the airspace for which notice has been given of an RPAS flight is false. A NOTAM about the RPAS flight being issued does not guarantee the security of a safety zone.
- As regards airspace classes C and D, pilots might perceive the function of air traffic control incorrectly; air traffic control provides as much information as possible about the presence of aircraft, but will **not** give separation services 'VFR – VFR' (including RPAS pilots).

Abbrev.	In full	Explanation
ABL	Analyse Bureau Luchtvaart	Unit of the Civil Aviation Authority the Netherlands (part of the Human Environment and Transport Inspectorate).
AGL	Above ground level	Height above ground or water.
CTR	Control Zone	Specified part of the airspace around an airport where air traffic control is provided.
EHR	Europe Holland Restricted	Specified part(s) of the airspace closed or restricted for civil flights.
HEMS	Helicopter Emergency Medical Services	Helicopter Emergency Medical Services
A B C D E F G	Airspace class	For each class of airspace (denoted by a letter), there is an internationally agreed set of rules for flight visibility, distance from clouds, accessibility for VFR or IFR air traffic, and the type of service provided by air traffic control units.
ICAO	International Civil Aviation Organization	UN agency for civil aviation.
RPA	Remotely Piloted Aircraft	Unmanned aircraft controlled remotely by a professional pilot.
RPAS	Remotely Piloted Aircraft Systems	Unmanned aircraft controlled remotely plus ground station.
NOTAM	Notice to Airmen	Message to flight crew members about airports or airspace.
IFR	Instrument Flight Rules	Rules that apply in addition to the general rules of the air. No Visual Meteorological Conditions are specified, because flights can be carried out by reference to instruments only.
VFR	Visual Flight Rules	Rules that apply in addition to the general rules of the air. Visual Meteorological Conditions are specified for each airspace class.

Appendix

Apart from the above information from the ABL (the Inspectorate's unit that analyses aviation incidents), experts from the Civil Aviation Authority the Netherlands (*ILT/Luchtvaart*) have made the following recommendations:

Flight preparation

- Before take-off, check that the equipment or the ground station is functioning correctly in all respects.
- The properties of a ground station may change if it is used for a different RPAS. Accordingly, always use a ground station in combination with a specific RPA or, before the next flight, check that it is fully functional with your RPA.
- When preparing for take-off, check the possibility of turbulence. If the turbulence during the flight is greater than expected, guide the RPA back to the landing field immediately not 'by hand' but mostly 'by computer'.
- Transferring all or part of the control of the RPAS or the payload is error-prone. It sometimes occurs that control of the RPAS is transferred unintentionally or unexpectedly to the cameraman. Eliminate the risk of this happening by segregating the RPAS and payload control functions when preparing for take-off.
- Do not fly an aircraft if it has toppled over while the propellers or rotors were turning, even if there is no visible damage. There might be internal damage that can be detected and repaired by the manufacturer only.
- Not all manufacturers test software updates before offering them to users. Accordingly, after every update, check that the RPAS is functioning correctly in all respects. Do this as part of preparation for take-off, testing the equipment in a safe location.

In use

- Giving practical lessons requires training and skills. This also applies to transferring the control of functions from the instructor's ground station to the student's. A dry run can also be used here.
- If the automatic pilot of the RPAS has difficulty with the weather conditions, do not switch to manual control. Instead, have the automatic pilot guide the RPA back to the landing field immediately.
- Model aircraft and RPAS must give way to all other air traffic, even if the air traffic control unit has given permission to fly in controlled airspace.
- In local air traffic control zones of class C or D, pilots are responsible for maintaining a safe separation between aircraft flying in VFR, which includes RPAS. This is not a task or responsibility of air traffic controllers.
- In most locations, model aircraft are allowed to fly at heights up to 300 metres/1000 feet above ground or water. If the ground station does not include an altimeter (which is not mandatory), the pilot of a model aircraft has to estimate the height at which it is flying.
- A NOTAM giving the location where an RPAS is going to be used does not represent an invitation to view its activities from another aircraft, manned or unmanned. Nor does the NOTAM mean that the airspace is reserved exclusively for the RPA.
- The risk of collision will be greatly reduced if a model aircraft (recreational used drone) is only used at a model aircraft field.

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