**A Summary of the Proposed Amendments to the Canadian Aviation Regulations**

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In July 2017, Transport Canada published in the Canada Gazette the full text of their proposed amendments to the Canadian Aviation Regulations, which will introduce regulations specific to the operation of Unmanned Aerial Vehicles (UAVs) in Canada. The new regulations will cover three categories of UAVs: very small UAVs, with a takeoff weight of 250 grams to 1 kilogram; small UAV, limited environment, with a takeoff weight of 1 to 25 kilograms being used in rural environments; and small UAV, complex environment, which covers UAVs weighing 1 to 25 kilograms in urban environments, controlled airspace, or near aerodromes. A set of rules and operating conditions is set out for each of these categories, and as long as a UAV operator follows those rules and conditions, they will be allowed to operate without being required to apply for an SFOC or notify Transport Canada of their intentions.

**The goal of this article is to quickly summarize the new CAR changes for each proposed UAV category**, organized in the following way:

* Table 1: Some conditions apply to all UAV operations, no matter the category; these are summarized two columns, “Must Do” and “Must Not Do”
* Table 2: these conditions apply differently to each UAV category and are summarized in a way that makes it easy to compare the conditions among the three categories.
* Table 3: these conditions do not apply to Very Small UAVs but do apply to both Small UAV categories
* Table 4: these conditions apply only to Small UAVs in Complex Environments

More information on the proposed CAR amendments and a “translation” of the technical aviation terminology into layperson terms can be found on CloudUAV in the article **Proposed Amendments to the Canadian Aviation Regulations: What do they mean, anyway?** Additionally, a list of links to Transport Canada resources is below.

* <https://www.tc.gc.ca/eng/civilaviation/opssvs/proposed-rules-drones-canada.html> - a summary of the proposed rules that will come out of the changes to the CARs, organized by UAV category
* <http://www.gazette.gc.ca/rp-pr/p1/2017/2017-07-15/html/reg2-eng.php> - the full text of the proposed CAR amendments, published in the Canada Gazette
* <https://www.tc.gc.ca/eng/civilaviation/opssvs/getting-permission-fly-drone.html> - a summary of current (as of fall 2017) UAV regulations in Canada
* <http://laws-lois.justice.gc.ca/PDF/SOR-96-433.pdf> - a PDF version of the current CARs

**Requirements for ALL UAS Operations**

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| **Must Do** | **Must Not Do** |
| UAV must have name, address, and telephone number of operator visible on aircraft. | UAV cannot leave Canadian Domestic Airspace. |
| Determine that the aircraft is fit for flight before takeoff.This includes the pilot deeming it serviceable, and maintenance of all components has been completed and kept up to date in accordance with manufacturer’s instructions | Do not operate at a lower altitude than allows the aircraft to glide clear of persons or property on the ground in case of emergency landing. |
| Notify the appropriate air traffic control as soon as a UAV is not under pilot’s control or enters or is about to enter controlled airspace. | Do not operate in close proximity to other aircraft as to create risk of collision. |
| Give way to manned aircraft at all times. | Do not operate in a reckless or negligent fashion. |
| Keep the UAV within visual line of sight at all times. | Do not carry living creatures on board a UAV. |
| Visual observers must communicate with the pilot in timely and reliable way, relaying information on hazards and air traffic. A person can’t be an observer for more than one UAV at a time. An observer cannot perform duties from a moving vehicle without an SFOC. | Do not operate a UAV within 12 hours of consuming an alcoholic beverage, while under the influence of alcohol or drugs, or while impaired. |
| Stop operations the moment aviation safety or the safety of a person or property is threatened. | Do not use explosive, corrosive, flammable, biohazardous, or light-emitting payloads without an SFOC. |
| Before take-off or landing ensure the site for take-off/landing is suitable and there is not risk of collision with anything. | Do not use a portable electronic device near a control station if it may interfere with the control station. |
| Prior to operations, the pilot must be familiar with aeronautical charts, NOTAMs, and CFS for the area being flown in. | Do not operate a UAV unless in accordance with manufacturer’s operating limitations. |
| Prior to operations, the pilot must know weather information relevant to their flight. | Do not operate a UAV from a moving vehicle without an SFOC. |
| Prior to operations, the pilot must ensure there is enough fuel or energy to complete the flight. | Do not operate if radio emissions from the aircraft will activate wireless triggers for special effects/fireworks. |
| Prior to operations, the pilot must ensure each crew member knows their duties during operations as well as location and use of emergency equipment. | Do not operate if the pilot cannot take immediate control of the aircraft at any time. |
| All crew members must comply with the pilot’s instructions at all times. | Do not use a first-person view device unless a visual observer is also watching the aircraft. |
| Operations must be ceased if any of the listed incidents or accidents occur: injuries to a person, contact with a person, animal, vehicle, vessel, building, structure, damage to the UAV, the UAV leaves lateral or altitude boundaries, collision or less of separation (getting too close to) another aircraft, UAV flies away or becomes uncontrollable, any other incident requiring a Canadian Aviation Daily Occurrence Report | Do not hand over control to another pilot or transfer control to another control station without an SFOC. |
| Prior to operations, pilot must confirm no radio interference is likely. | Do not operate more than one UAV at a time. |
| If take-off occurs from an altitude about 10,000 feet ASL all crew members must use oxygen during operations. | Do not use a flight termination system if it will endanger aircraft, people, or property. |
| Manufacturer’s operation manual must be immediately available to all crew members during operation. | Don’t operate a UAV with an ELT on board. |
| Operation in transponder airspace is only allowed if a) the UAV has a transponder and pressure-altitude reporting equipment or b) an air traffic control unit allows permission | Do not use an aircraft that allows flight controls to be lock unless they can’t be locked during flight and warn the pilot whenever flight lock is engaged. |
| A minimum of $100,000 in liability insurance must be held covering each person involved. | Do not operate in aviation events without an SFOC. |

**Specific Regulations for Each UAS Weight Category**

| **Category** | **Very Small (250 g – 1 kg)** | **Small – Limited (1 – 25 kg)** | **Small – Complex (1 – 25 kg)** |
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| **Pilot Knowledge or Permit** | Pilots must have completed a pilot knowledge test and obtain a grade of 60% in the last 5 years. | Pilots must have completed a pilot knowledge test and obtain a grade of 60% in the last 5 years. | Pilot must hold a pilot permit from Transport Canada |
| **Minimum Pilot Age** | 14 years | 16 years | 16 years |
| **Aircraft Registration, Marking, Compliance** | Must be marked with pilot’s name and contact information | Must be marked with pilot’s name and contact information | Aircraft must be marked and registered in Canada; markings or placards required by manufacturer must be in place; must be TC-compliant |
| **Authorized Airspace** | Class G only | Class G only | Class C, D, E, G; Class F (except Class F Special Use Restricted – Military or UAS Operations, requires permission) |
| **Max Altitude** | 300 feet AGL | 300 feet AGL, or 100 feet above a building or structure if laterally within 200 feet of it and more than 3 nm from an aerodrome | 400 feet AGL, or 100 feet above a building or structure if laterally within 200 feet of it and more than 3 nm from an aerodrome |
| **Max Speed** | 25 knots (29 mph) | 87 knots (100 mph) | 87 knots (100 mph) |
| **Max Distance from Pilot** | 0.25 nm (0.463 km) | 0.5 nm (0.926 km) | 1 nm (1.85 km) |
| **Min Lateral Distances** | ≥100 feet from people not involved in the operation unless above 100 ft AGL and slower than 10 knots | ≥ 250 feet from uninvolved person, vehicle, or vessel unless no hazard is created, above 250 feet AGL, and flying at less than 10 knots. | ≥ 100 feet from uninvolved person, vehicle, or vessel, unless no hazard is created, above 100 feet AGL, and flying at less than 10 knots. |
| **Meteorological Conditions** | Aircraft clear of cloud, ground visibility must be 2+ statute miles | Aircraft clear of cloud, ground visibility must be 2+ statute miles | Ground visibility 3+ statute miles and distance of aircraft from cloud must be ≥500 feet vertically and 1 mile horizontally. |
| **Crew Training** | Not required | Crew members must have up-to-date qualifications and training | Crew members must have up-to-date qualifications and training |
| **Operations at Aerodromes** | Prohibited | Prohibited without SFOC | Allowed with air traffic control unit coordination and permission |
| **Min Distance from Aerodromes** | 3 nm (5.5 km) from aerodrome, 1 nm (1.85 km) from heliport | 3 nm (5.5 km) from aerodrome, 1 nm (1.85 km) from heliport | None, but requires coordination with air traffic services within controlled airspace |
| **Controlled or Restricted Airspace** | Prohibited | Prohibited | Allowed with conditions |
| **Night Operations** | Prohibited | Prohibited | Allowed with conditions |
| **Open-Air Assemblies of Persons** | Prohibited - must maintain lateral distance from crowd of at least 100 feet | Prohibited – must maintain lateral distance from crowd of at least 500 feet | Within a lateral distance of 500 feet to assembly of persons, allowed with conditions |
| **Min Distance from Built-up Areas** | None | 0.5 nm of the boundary of a built-up area | Within a lateral distance of 500 feet to built-up area boundary, allowed with conditions |
| **Other prohibitions** | n/a | No towing anything, flying in formation with other aircraft, or performing acrobatic maneuvers without an SFOC | If an aircraft was bought before Dec 15, 2017 and is not a TC-certified compliant platform, it cannot operate above 300 feet AGL, more than 0.5 nm from the pilot, within 0.5 nm of a built-up area, over or within a built-up area, or in Class C, D or E airspace. |

**Regulations common to Small UAVs in both Limited and Complex environments**

| **Small UAS (1 – 25 kg) Regulations Common to Limited and Complex Operations** | |
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| **Site Survey** | Prior to take-off, pilot must perform a site survey taking into account: boundaries of area of operation; class of airspace and regulations; altitude and routes to be used on approach and departure from area of operation; proximity of manned aircraft operations; proximity of aerodromes; hazards associated with nearby industrial sites; proximity to high-intensity radio transmissions or electromagnetic interference; location and height of obstacles including wires, masts, buildings, cell towers, wind turbines; proximity to built-up areas, roadways, and recreational activity sites; security measures to limit public access to site; predominant weather conditions; and minimum separation distances from persons, vehicles, buildings, structures |
| **Normal Procedures** | Normal operations procedures for system assembly, pre-flight checks, take-off and launch, landing and recovery, performance limitations, refueling/recharging, and use of checklists must be in place. |
| **Emergency Procedures** | Must be established prior to take-off, covering: engine failure or fire; gliding; emergency landing or recovery; structural failure of aircraft; control station failure; equipment failure; pilot incapacitation; potential conflict with other aircraft |
| **Lost C2 Link Procedures** | Lost command and control link risks must be assessed before take-off and C2 emergency procedures covering the following must be established prior to operations and immediately available to pilot: route of flight during lost C2 link event; use of transponders; orbit points in event of lost link; communications with air traffic service if applicable; contingency planning measures in event that C2 link cannot be re-established, including pre-programmed flight termination points and automatic landing or recovery procedures. |
| **Fly-away contingency procedures** | Fly-away contingency procedures must be established and available to the pilot before operations, including how to determine if UAV enters controlled airspace and contact information for controlled airspace the UAV could enter. |
| **Altimeter-setting procedures** | If operating in an altimeter-setting region or standard pressure region, before take-off the pilot must set the altimeter to the appropriate setting for that region. |
| **Flight Termination Contingency Procedures** | Flight termination procedures with respect to following factors must be established and available to the pilot prior to operations: how to determine when flight termination is required; how to contact air traffic service unit; pre-programmed flight termination points; flight routes to flight termination points. |
| **Operational and Emergency Equipment** | A checklist or placard enabling the UAV to be operated in accordance with manufacturer’s limitations, and a fire extinguisher must be available during all operations |
| **Capability Requirements** | Must be means of: controlling flight of aircraft; monitoring the proper function of the unmanned aircraft system; navigating the aircraft, performing communications with air traffic control; detecting hazardous environmental flight conditions; mitigating the risk of loss of control; providing sense and avoid functions; and remaining clear of cloud at required distance |
| **Icing** | UAV can’t be flown with snow, ice, or frost on critical surfaces and must be inspected for these by the pilot or a designated crew member before operations. Pilot must inform crew members before anti-icing or de-icing occurs. IF cold-soaked fuel is on the underside of the UAV’s wings and the launch can be conducted in accordance with manufacturer’s instructions, take-off may occur. If icing conditions are forecast or likely, operations cannot occur unless the pilot deems the aircraft has the necessary equipment to operate or icing conditions no longer exist. |
| **Technical Records** | Technical records of flight time of each flight, total aircraft flight time, number of landings since date of manufacture, and particulars of maintenance, modifications, and repairs must be kept. If ownership of a UAV is transferred records must be transferred too. |

**Conditions for Small UAV Complex Environment Operations**

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| **Operation** | **Conditions for operation to be allowed under Small UAV Complex Environment Rules** |
| **Controlled or Restricted Airspace** | Coordination with the provider of air traffic services in the area of operation at least seven days before a proposed operation and air traffic services must be given the listed information.  Pilot must comply with and acknowledge receipt of all air traffic instructions from air traffic control, comply with all air traffic control clearances received by the pilot, and during VFR flight, read back text of any air traffic control clearance received when requested by air traffic control.  No operations are allowed in Class F Special Use Restricted Airspace – Military Operations unless, at least 30 days before operation, the person obtains written authorization from the Base and a written letter from the Minister of National Defense allowing the operation. |
| **Night Operations** | Aircraft must have turned-on position lights and anti-collision lights; LED lights must be of intensity and spectrum to be seen with or without night-vision goggles; Aircraft must have means of illumination sufficient to maintain a visual line of sight with the pilot; Every crew member must have a portable emergency light source accessible; No crew member can conduct night operations if they have visual limitations related to depth perception, colour blindness, or visual acuity in low light; Take-off and landing site must be lighted and operations conducted under a SFOC; Night vision goggles can’t be used to perform sense and avoid functions |
| **Open-Air Assemblies of Persons** | Within a lateral distance of 500 feet to assembly of persons, operations cannot occur unless aircraft is flown at greater than 300 ft AGL and an emergency landing is necessary it is possible without creating a hazard to people or property.  Before take-off or launch pilot must conduct an assessment of hazards present including meteorological conditions, and probability of lost command and control links or fly-away; establish procedures and precautions related to operations that ensure no hazard is created to people or property; establish a site for take-off and landing with a minimum diameter of 20 m from the point of take-off that has access restricted to crew members and is clear of obstacles. Aircraft must reach the minimum altitude required for the operation at an expedited rate of climb. |
| **Min Distance from Built-up Areas** | Within a lateral distance of 500 feet to built-up area boundary, operations cannot occur unless aircraft is flown at greater than 300 ft AGL and an emergency landing is necessary it is possible without creating a hazard to people or property.  Before take-off or launch pilot must conduct an assessment of hazards present including meteorological conditions, and probability of lost command and control links or fly-away; establish procedures and precautions related to operations that ensure no hazard is created to people or property; establish a site for take-off and landing with a minimum diameter of 20 m from the point of take-off that has access restricted to crew members and is clear of obstacles. Aircraft must reach the minimum altitude required for the operation at an expedited rate of climb. |