



# Advisory Circular

## AC102-1

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### Unmanned Aircraft - Operator Certification

Revision 1 (0)  
27 April 2016

#### General

Civil Aviation Authority advisory circulars contain information about standards, practices, and procedures that the Director of Civil Aviation ('the Director') has found to be an acceptable means of compliance with the associated rule.

An acceptable means of compliance is not intended to be the only means of compliance with a rule, and consideration will be given to other methods of compliance that may be presented to the Director. When new standards, practices, or procedures are found to be acceptable they will be added to the appropriate advisory circular.

An advisory circular may also include guidance material to facilitate compliance with the rule requirements. Guidance material must not be regarded as an acceptable means of compliance.

#### Purpose

This advisory circular provides guidance and compliance advice for meeting the requirements for certification of unmanned aircraft operators under Part 102 Unmanned Aircraft Operator - Certification.

#### Related Rules

This advisory circular relates specifically to Civil Aviation Rule Part 102 but also refers to requirements in operating rule Part 101.

#### Change Notice

Subject to "Memorandum for Technical Cooperation" between the CAA of Mongolia and New Zealand on mutual cooperation in implementation of Assembly Resolution A29-3: Global Rule Harmonization, 29<sup>th</sup> ICAO Assembly, 1992, which urges States to promote global harmonization of national rules, dated 6<sup>th</sup> of May, 1999, Mongolian Civil Aviation Safety Regulation has been reconciled to the Civil Aviation Regulation of New Zealand.

This Part 102 has been released in English and Mongolian language. In the event of any conflict and discrepancy between the two above mentioned versions, English version shall prevail.

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## Glossary

The following terms are used throughout this document.

|       |   |
|-------|---|
| AC    | advisory circular                         |
| AGL   | above ground level                        |
| AIP   | Aeronautical Information Publication      |
| ATC   | air traffic control                       |
| BVLOS | beyond visual line of sight               |
| ATM   | air traffic management                    |
| CAR   | Civil Aviation Rules                      |
| CAA   | Civil Aviation Authority                  |
| EVLOS | extended visual line of sight             |
| FPV   | first person view                         |
| ICAO  | International Civil Aviation Organisation |
| IAW   | in accordance with                        |
| LAME  | licensed aircraft maintenance engineer    |
| LEP   | list of effective pages                   |
| LSA   | light sport aircraft                      |
| MFM   | Model Flying Mongolia                     |
| NM    | nautical miles                            |
| RP    | remote pilot                              |
| RPA   | remotely piloted aircraft                 |
| RPAS  | remotely piloted aircraft system          |
| SMS   | safety management system                  |
| SOP   | standard operating procedures             |
| SC    | support crew                              |
| UA    | unmanned aircraft                         |
| UAS   | unmanned aircraft system(s)               |
| UAV   | unmanned aerial vehicle                   |
| UAOC  | unmanned aircraft operators certificate   |
| VLOS  | visual line of sight                      |
| VLA   | very light sport aircraft                 |
| VMC   | visual meteorological conditions          |

## Background

The civilian use of remotely piloted aircraft systems (RPAS) has markedly increased in recent years. Research and development into the civilian applications of RPAS is a dynamic and rapidly evolving area. Control and guidance systems are now available, that enable these aircraft to perform a variety of tasks that were previously unachievable, cost prohibitive, or involved excessive personal risk. Consequently, RPAS have an increasing presence in controlled and uncontrolled airspace.

Growth of RPAS use is currently concentrated in smaller aircraft, similar to model aircraft in size (though not necessarily in performance). However, the use of larger, conventional aircraft is also growing.

This advisory circular provides compliance guidance and explanatory material to assist operators to understand what is required and when and how to obtain certification under Part 102.

The advisory circular should be viewed as a dynamic document and something that will be added to, as more information and understanding is obtained about the range and scope of activities being certificated under Part 102. Amendments will also be made in light of safety and technology advances in the RPAS sector. The advisory circular does not provide prescriptive or exhaustive detail on what an operator must and must not do in respect of a particular type of RPAS application; rather, it is intended to guide operators preparing to make an application to the CAA for Part 102 certification. We expect to update the advisory circular regularly, in response to demands for further guidance and compliance advice. The CAA will monitor trends and recurring inquiries to ensure that meaningful guidance is provided proactively through the advisory circular.

Part 101 and Part 102 operate alongside one another. It is important to emphasise that Part 102 has been designed, for now, as a 'stand-alone' rule for unmanned aircraft, however the applicant will be required to comply with the relevant requirements of Part 101, unless the Part 102 certificate provides otherwise. Part 102 provides a framework for unmanned aircraft that is flexible, providing the Director with the discretion to tailor fit-for-purpose safety and operational requirements to each proposed operation. Given the rapid advancements underway with unmanned aircraft technology, this approach ensures the regulatory regime can accommodate these aircraft, while addressing the risks relating to their activity.

*Unmanned aircraft that weigh less than 25 kg, and operate entirely in accordance with Part 101 rules, are not the focus of this advisory circular. Please refer to Part 101 and AC101-1 for requirements relating to these aircraft.*

### **What types of aircraft does this AC apply to?**

There are a wide range of terms used to describe these aircraft, including unmanned aerial

vehicle (UAV), unmanned aerial system (UAS), 'drone' or model aircraft.

Part 101 and Part 102 use a number of different terms, which are defined in different parts of the rules. For ease of reference these are outlined below.

For Part 102 operations, the key term is 'unmanned aircraft'. An unmanned aircraft is—  
*'an aircraft designed to operate with no pilot on board, including unmanned balloons, kites, control-line model aircraft, free flight model aircraft and remotely piloted aircraft'.*

The rules also refer to an unmanned aircraft system which is—

*'an aircraft and its associated elements which are operated with no pilot on board'.*

Part 102 applies to all unmanned aircraft that do not operate under Part 101. This could include any autonomous aircraft (not to be confused with RPAS that can be programmed to operate automatically or on an automatic basis).

Under Part 101, the term 'remotely piloted aircraft' is defined as a subclass of unmanned aircraft. A 'remotely piloted aircraft' is—

*'an unmanned aircraft that is piloted from a remote station and—*

*(1) includes a radio controlled model aircraft, but*

*(2) does not include a control line model aircraft or a free flight model aircraft: "*

A remotely piloted aircraft includes its associated remote pilot station or stations, the required command and control links and any other components required to operate the system.

For the purposes of providing relevant compliance advice in this advisory circular, we use the following descriptions

*Small unmanned aircraft means under 25 kg; and*

*Medium unmanned aircraft means 25 to 150 kg; and*

*Large unmanned aircraft means over 150 kg.*

### **What about model aircraft?**

Model aircraft are traditionally regarded as small unmanned aircraft flown by hobbyists for purely recreational reasons. While Part 101 still refers to subcategories of 'model aircraft', such as free flight model aircraft and control line model aircraft, the more general term 'model aircraft' no longer exists. Model aircraft are now referred to as 'remotely piloted aircraft' under Part 101, and are unmanned aircraft for the purposes of Part 102. The rules do not make a distinction between remotely piloted aircraft that are operated for commercial or recreational purposes.

This position reflects the CAA's view that the aviation-related risk posed by remotely piloted aircraft differs very little, between an aircraft that is used for recreational purposes or

commercial purposes. As an example, the risk to persons or property from a small unmanned aircraft taking an aerial photograph or video is the same, whether the photograph or video is sold or retained for private use. The important aspect is that the risks to persons and property are managed in both cases.

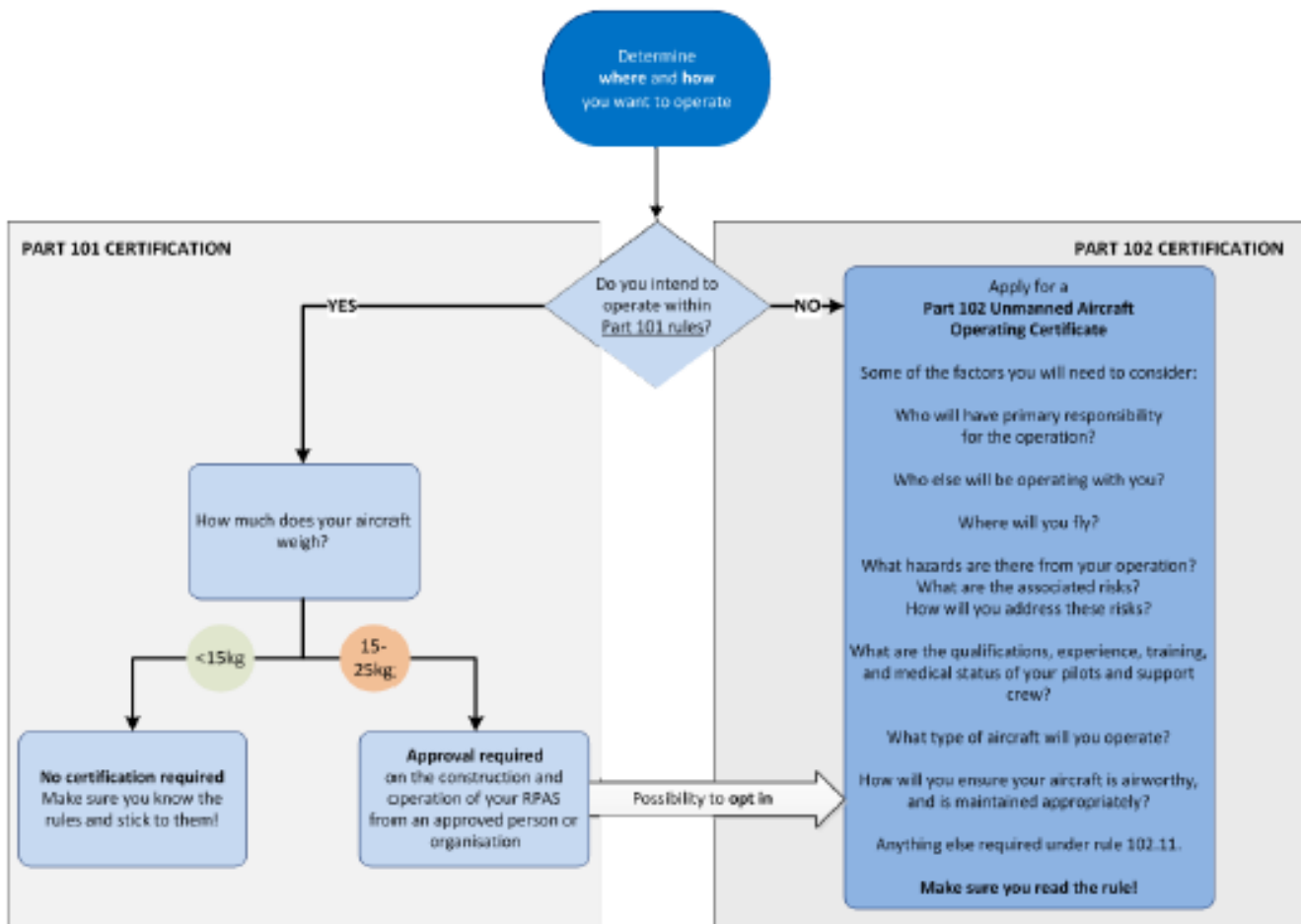
Therefore, 'model aircraft' meet the definition of remotely piloted aircraft, and are subject to regulation under Part 101, or Part 102 if operating beyond the limits prescribed in Part 101.

## Rules 102.1 Purpose, 102.3 Application & 102.7 Requirements

### Do I need a certificate?

You require an unmanned aircraft operator certificate (UAOC) issued under Part 102, if you intend to operate an unmanned aircraft that cannot operate strictly within the limitations of Part 101. Figure [1] outlines the decision pathway for operators to consider.

Figure [1]



### How do I know if I should operate under Part 101 or Part 102?

There are 12 key operating requirements under Part 101.

You must:

- (1) not operate an aircraft that is 25 kg or larger and always ensure that it is safe to operate; and
- (2) at all times, take all practicable steps to minimise hazards to persons, property and other aircraft (i.e. don't do anything hazardous); and

- (3) fly only in daylight; and
- (4) give way to all manned aircraft; and
- (5) be able to see the aircraft with your own eyes (e.g. not through binoculars, a monitor, or smartphone), to ensure separation from other aircraft (or use an observer to do this in certain cases); and
- (6) not fly your aircraft higher than 120 metres (400 feet) above ground level (unless certain conditions are met); and
- (7) have knowledge of airspace restrictions that apply in the area you want to operate; and
- (8) not fly closer than four kilometres from any aerodrome (unless certain conditions are met); and
- (9) when flying in controlled airspace obtain an air traffic control clearance issued CAA; and
- (10) not fly in special-use airspace without the permission of the controlling authority of the area (e.g. military operating areas, low flying zones or restricted areas); and
- (11) have consent from anyone you want to fly above; and
- (12) have the consent of the property owner or person in charge of the area you are wanting to fly above.

This list should not substitute for a full reading of Part 101. You should conduct a thorough assessment of your operation and ensure you understand the Civil Aviation Rules that apply to your operation, before deciding whether to operate under Part 101 and Part 102.

Some exceptions may apply, but generally if you cannot meet any of these requirements, this is a good signal that your operation will need to be certificated under Part 102.

### **General guidance material**

#### ***Thinking about your proposed operation***

Before you make an application to the CAA for an unmanned aircraft operator certificate under Part 102, you will need to give some thought to the scope of your proposed operations.

Below are some useful prompting questions that will help define the level of risk posed by your operation, and thus the appropriate regulatory response. The list of questions below are only some of the considerations for prospective unmanned aircraft operators, and provides guidance based on CAA's current understanding of RPAS capabilities, and the current Mongolian RPAS environment. The advisory circular does not detail specific requirements for different applications or uses; we will consider each application on its merits. You will be expected to demonstrate how you intend to address the hazards identified, and the associated risks presented by your operation.

The series of questions below will help you decide what aspects of Part 101 you may not be able to comply with, and therefore the areas where you will need to pay particular focus on in preparing your application.



***Do you want to operate an aircraft that is larger than 25 kg?***

If you want to operate an aircraft with a gross mass of 25 kg+, you are automatically covered by Part 102. You will only be permitted to operate an aircraft over this weight under the authority of a Part 102 certificate.

The gross mass of 25 kg includes any payload carried by the aircraft.

***Do you want to operate an aircraft that is larger than 15 kg?***

If you want to operate an aircraft that weighs more than 15 kg, but not more than 25 kg you may be covered by Part 102.

Aircraft weighing between 15 kg and 25 kg may only be operated under Part 101, if it is constructed and operated under the authority of an approved organisation. *Please contact the CAA for further information about becoming an approved organisation.*

***Do you intend to operate at night?***

If you wish to fly at night you will need to explain in your application how you propose to address—

- the availability of aircraft lighting/aids to ensure your aircraft is visible to other remotely piloted aircraft operators or manned aircraft; and
- how you will maintain visual contact with the aircraft; and
- area of proposed operations; and
- risks to persons or property on the ground; and
- notification of flights to emergency services.

The term 'day' is as listed in the Aeronautical Information Publication - Daylight Tables that can be viewed for free on <https://www.ais.mn>

. These tables list different locations around Mongolia and the time at which day officially turns to night or night to day.

***Do you want to operate over crowds or in congested areas?***

Operating above gatherings of people or congested areas where people may be present is inherently hazardous.

Flight above or in proximity to people at sporting events or other events (whether held indoors or outdoors) involving large or dense crowds of people have additional risks.

Applicants will be expected to address the following in their applications—

- identification of the hazards and risks, including those that might be exacerbated by a crowd or people being present; and
- the configuration of the aircraft (fixed wing vs multi rotor or airship); and
- reliability of the machine; and

- reliability of the control system; and
- mitigations in place in the event of any system failure; and
- system redundancy (such as an acceptable automatic recovery parachute); and
- if practicable, the steps the operator proposes to take to obtain the consent or give notice to person affected by the operation.

Operating close to buildings or structures where people are present or in close proximity may also be hazardous. If you are proposing to use an aircraft close to buildings you will need to address additional things such as—

- procedures for dealing with impact with structures or objects; and
- crowd/access control to ensure a safety perimeter in the event of the aircraft falling to the ground.

### ***Do you want to operate beyond visual-line-of-sight (BVLOS)?***

We expect that for the foreseeable future the standard operating environment will be to operate within unaided visual line of sight (VLOS). ‘Unaided’ means that the aircraft is able to be seen by the operator without the use of an instrument, such as binoculars or a telescope.

While Part 102 does not prohibit BVLOS operations, these types of operation present a number of challenges for operators. The risks associated with such operations mean that if you are intending to undertake BVLOS operations, you will need to present a strong safety case in your application. Some of the features of a safety case would include—

- identification of the airspace class to be used and associated requirements and how they will be met; and
- ability to provide separation from other traffic, such as segregated airspace or a technological solution (e.g. seek, detect and avoid systems); and
- mitigate risk to persons, property and terrain.

BVLOS operations relying on segregated airspace will need to have successfully obtained approval, for the designation of such airspace before operations would be approved.

Applicants should be aware that the establishment of special-use airspace in accordance with a Part 71 authorisation (i.e. military operating areas, restricted areas or danger areas) on a frequent basis, and/or in numerous locations, can disrupt the conventional aviation system. In some cases, the use of special-use airspace is not likely to be a workable solution, except in limited numbers and for specific purposes, such as research and testing in areas of low intensity aviation activity.

Unmanned aircraft that are being flown using First Person View (FPV), or from a remote device that requires the attention of the pilot, will still require an observer to be present to maintain the unaided visual line of sight contact at all times with the aircraft. This observer is, among other things, to advise the pilot of any other traffic that enters the operational area.

An FPV operation without an observer is considered a BVLOS operation and will require operators to address the safety case considerations above.

### ***Can I use observers to extend my Visual Line of Sight (VLOS)?***

Extended visual line-of-sight (EVLOS) means observing an extended area of airspace by utilizing observers at the boundary of the area, who are in direct contact with the pilot/operator. The observers provide the separation by ensuring no other traffic enters the operational area.

A good example of where this process has been utilised is in the surveying of power-lines. This is also considered a possible solution for some of the precision agriculture tasks that may utilize unmanned aircraft.

EVLOS can be approved if conducted with a number of appropriate support crew for the operation, and you can ensure the separation of unmanned aircraft from other aircraft. If you wish to conduct EVLOS operations you will need to establish a procedure for contacting other aviation operations in the area (e.g. for agricultural operations, other manned agricultural aviation operators, or local helicopter operators), to ascertain when and where they intend to operate in a specific area and to advise them of the intended unmanned aircraft operation.

### **Do you want to fly above 400feet?**

Under Part 101, a 400 ft ceiling applies to remotely piloted aircraft operations (with some exceptions).

The purpose of this ceiling is to create a buffer between conventional aircraft and those that are operated under Part 101.

Conventional aircraft are generally not permitted to fly below 500 ft, unless they have a bona fide reason to do so. Conventional aircraft do operate below 500 ft, such as agricultural operations. Aircraft also operate below 500 ft when landing and taking off. This is why there is an overarching obligation on remotely pilot aircraft operators, to give way to all manned aircraft. The give way rule applies to both Part 101 and Part 102 operations, unless a Part 102 certificate provides otherwise.

If you want to operate above 400 ft you will need to first identify the class of airspace that you intend to operate in. Different rules apply depending on the airspace you intend to fly in. You may also need to consult MCAA to understand if you require a clearance or special equipment, such as a transponder, or have to abide by any other conditions that they might set on the operation.

### ***Do you want to fly within 4 km of an aerodrome?***

You are free to use your aircraft within 4km of an aerodrome if it is a shielded operation. Shielded operations are defined in Part 101. Examples could be a flight that takes place in a stadium below the height of the roof, or a flight that takes place in a forested area below the height of the trees.

If you wish to fly a non-shielded operation within 4 km of an uncontrolled aerodrome, it is important that you demonstrate an understanding of the risks of doing so and can demonstrate ways of managing those risks. If you are unable to reach an agreement with the aerodrome owner under Part 101 rules, then you may be able to get a Part 102 certificate that does not include this requirement.

However, for this to happen, it will be important for you to demonstrate that you have thought through the following—

- how you can inform the airfield operator as to what you are doing; and
- how you will monitor the appropriate frequencies; and
- anything else that will be relevant to ensure the safety of the manned aerodrome in question.

It will also be important to demonstrate that you have the requisite knowledge and skills to operate near an aerodrome, and use the necessary technical equipment to communicate with air traffic control. This could include—

- a pilot licence issued under Part 61; and
- a pilot certificate issued under Part 149; and
- a pilot qualification issued by an approved organisation

### ***Do you want to fly above people without getting consent from them?***

Under Part 101, operators are required to avoid using airspace above people unless they have the consent of people below the flight. This requirement applies to both private property as well as public land, and public spaces.

For more information about the consent rule (rule 101.207(a)(1)), refer to AC 101-1.

Generally, operating above people without their consent is likely to be a hazardous activity. You will need to explain in your application why it is not possible or practicable to obtain consent from the people you intend to fly above.

In deciding whether to relax or remove the requirement to obtain consent, relevant considerations would include—

- the weight and size of the aircraft involved; and
- the configuration of the aircraft (fixed-wing vs multi-rotor or airship) - (things such as the
- glide capability of the aircraft and whether rotor blades are closed/covered will be
- particularly relevant); and

- reliability of the aircraft; and
- reliability of the control system (and any related system); and
- mitigations in place in the event of any system failure, including “return home” functionality; and
- system redundancy (such as an acceptable automatic recovery parachute); and
- the geographical area that the aircraft is intended to be used; and
- the height(s) at which the aircraft will be operated; and
- consideration of the hazard register to establish the operator’s understanding of their
- operation and safety management.

If an operation is approved to be conducted without obtaining consent, you may still be required (as a condition attached to a certificate), to take reasonable steps to notify people who may be affected by an operation. This may include use of such mediums as newspaper advertising, letterbox drops, or signs affixed in a particular area or at the entry to an area of intended operation.

In other cases, for example a sports event, it may be possible to have notice included as part of a ticket to give attendees prior warning of an operation occurring (and establish acceptance of those operations as a condition of entry).

***Do you want to fly above property without getting consent from the property owner?***

Under Part 101, operators are required to avoid flying piloted unmanned aircraft in airspace above an area of property, unless prior consent has been obtained from any persons occupying that property or the property owner.

This requirement applies to both private property as well as public land, and public spaces.

Consent can be obtained from the property owner or occupier. In practice this will mean, for private property, the owner, a tenant, or a representative at the property. For public spaces, consent is needed from the agency or organisation owning or controlling that space (e.g. a local council or the Department of Conservation).

Consent may be implied or explicit depending on the situation involved and therefore may not have to be sought from the same people repeatedly, if standing arrangements or understandings are entered into.

The consent itself could take multiple forms, such as informally verbal, written, or more formally contractual. This will depend on the situation and the requirements of the landowner, the people involved and, potentially, the commercial imperatives of the operator.

Existing agreements and arrangements may be sufficient in certain cases. For example, commercial contracts that already guarantee access or through the implied consent of operations that have already taken place.

For more information about the consent rule (rule 101.207(a)(1)) refer to AC-101-1.

Seeking consent is a two-step process—

- (1) locate the landowner or person occupying that property (or their representative); and
- (2) seek the consent of those on the property or around your operation.

If it is not practicable or possible to obtain consent from property owners or property you intend to fly above, you will need a Part 102 certificate.

The reason you may not be able to obtain consent could include—

- that obtaining consent would be onerous namely due to—
  - the number of properties to be overflown; and
  - the location of the operation; and
  - of the nature of the operation (e.g., emergency services use); and
- an inability to locate a property owner or representative; and
- attempts to contact a property owner have failed; and
- unwillingness of a property owner to give consent; and
- it is unclear who is appropriate or authorised to give consent.

You will need to explain in your application, why it is not possible or practicable to obtain consent from the property owners/occupiers you intend to fly above.

In deciding whether to relax or remove the requirement to obtain consent, relevant considerations would include—

- the weight and size of the aircraft involved; and
- the configuration of the aircraft (fixed-wing vs multi-rotor or airship) -(things such as the glide capability of the aircraft and whether rotor blades are closed/covered will be particularly relevant); and
- reliability of the aircraft; and
- reliability of the control system (and any related system); and
- mitigations in place in the event of any system failure, including “return home” functionality; and
- system redundancy (such as an acceptable automatic recovery parachute); and
- the geographical area in which the aircraft is intended to be used; and
- the height(s) at which that the aircraft will be operated; and
- consideration of the hazard register to establish the operator’s understanding of their operation and safety management.

If an operation is approved to be conducted without obtaining consent, you may still be required (as a condition attached to a certificate), to take reasonable steps to give notice to people who may be affected by an operation. This may include use of such mediums as newspaper advertising, letterbox drops, or signs affixed in a particular area or at the entry to an area of intended operation.

It is important to note that even if you obtain consent, you remain subject to all other relevant legislation, including local body bylaws and requirements.

If you are using a camera or other similar technology you will likely be subject to the will Privacy Act.

### ***Do you want to carry out agricultural operations?***

Unmanned aircraft operations for agricultural purposes are potentially hazardous, as they can involve flying very low to the ground, the use of hazardous materials, and potentially involve operations near other low-flying aircraft.

Part 137 Agricultural Aircraft Operations is the current Part governing agricultural operations by manned aircraft. It provides a useful basis for considering the safety requirements of your proposed operation. Conditions may be imposed on a Part 102 certificate that reflect those of Part 137.

For example, personnel associated with your operation may be required, as a condition of their certificate, to hold agriculture and chemical ratings. The application of chemicals requires that operators be fully aware of the potential for overspray and accidental damage to other crops or property.

### ***Preparing your application and exposition***

Any unmanned aircraft operation will introduce hazards and risks that will need to be managed. This is the responsibility of the operator, so it is essential that you give this thorough consideration.

Establishing a hazard register is a crucial demonstration that you are aware of all the potential hazards, the level of risk each hazard poses, and the measures that will be taken to mitigate these risks.

When applying for an unmanned aircraft operating certificate, you must be able to demonstrate that the operation will be safe. The Director will look at the people involved in the operation, the aircraft, and the scope of the operation. The Director must be satisfied that the operation is safe, and that the operator is able to mitigate and control the risks before issuing the certificate.

To demonstrate the safety of the proposed operation, the operator also requires an exposition that should establish and document a set of standard operating procedures (SOP). The SOP should include a process for conducting a risk assessment on the type of operation, and the organisation intends to undertake. The SOP should take the form of a simple organisation manual that is controlled by the operator. Refer also to rule 102.11(b) (10) later in this advisory circular.

It is highly recommended that the operator establish a basic Safety Management System

(SMS) for their organisation.

In preparing your exposition, you may wish to incorporate requirements from other parts of the Civil Aviation Rules (for example, some requirements from Part 91 General Operating Flight Rules, or for an agricultural operation, Part 137 Agricultural Aircraft Operations). This would help to provide assurance to the Director that the operation is going to be conducted according to the highest possible safety standard.

### **102.9 Application for Certificate to Operate an Unmanned Aircraft**

Operators who either require, or would prefer, to be certified under Part 102, will need to make an application to the CAA on form CAA24102/01. The application form can be found on the CAA website ([www.mcaa.gov.mn](http://www.mcaa.gov.mn)) under Forms.

The application form is quite comprehensive. This is due to the need to cover a wide range of very different operations that may be undertaken. You may find that you do not need to complete all sections if your operation is relatively simple. This can be determined in consultation with CAA staff. The more information you provide, the easier the CAA's assessment of the application will be and consequently the time taken could be shorter.

We recommend that if you are planning to make a Part 102 application, you contact the CAA for a pre-certification meeting to discuss the scope of the proposed operations, and likely application requirements. There is no cost associated with this.

#### ***What we will assess?***

The CAA will review your entire proposed operation, using your exposition as the guiding document for this assessment.

Your hazard register will also be key to demonstrating that you understand all of the hazards related to your operation, and have mitigations in place to manage any associated risk.

### **102.11 Unmanned Aircraft Operator Exposition**

If you want to apply for an unmanned aircraft operator certificate, you are required to submit an exposition addressing a number of important matters relating to the proposed operation.

An exposition is a description of how an operator (no matter how big or small) will conduct its operations to maintain the required level of safety and remain in compliance with the rules.

To assist you, the CAA has compiled a Part 102 compliance matrix (CAA24102/03). This document identifies each rule requirement and has space for the applicant to identify the specific section/paragraph in their exposition that shows compliance with that specific rule clause. The matrix supports the application and is vital to the CAA assessment process, enabling considerable time and cost saving.



The preferred approach is for you to identify a section and/or paragraph reference against each rule clause. It follows that the exposition needs a section/paragraph numbering system. Further, for exposition control, page numbering, issue date, list of effective pages (LEP) and contents page are also needed. The introduction page of the compliance matrix has further guidance on this subject.

**102.11(b) General:**

This rule lists the items that are required to form an exposition. A well-written and comprehensive exposition will help the CAA to assess your application, especially if it provides a clear description of the operational procedures in your own words.

The Director has the discretion to require only some of these items, as appropriate to the particular circumstances, context and characteristics of the proposed operation. This emphasises the importance of a pre-certification meeting to discuss what might be expected from you.

**102.11(b)(1) Person with primary responsibility:**

This rule requires you to identify a “Prime Person”. As the title implies, this is the person who has primary control of the operation and is usually the person making the initial application. Usually this is the person responsible for funding the operation and/or providing the resources (including the aircraft). It is usual to provide a small organisational structure diagram (similar to a family tree), showing lines of responsibility between persons identified as having a responsibility for any part of the operation. For owner/operator operations this will be relatively straightforward, but for large organisations, it is expected that there are clear roles and lines of responsibility.

The prime person is also the person that will be subject of a fit and proper person assessment. Further information on fit and proper person assessment is detailed later in this advisory circular.

**102.11(b)(2) Person having control:**

This rule requires the identification of any person who has control over any part of the operation. This may be the person with control over the flights or training, or who is responsible for maintenance control. The use of the family tree would show the lines of responsibility and reporting back to the prime person.

**102.11(b)(3) Areas of operation:**

This rule requires the identification of the actual areas you will operate your RPAS. In some cases you will be able to delineate the area by street names. In other cases, a map marking out the area may be the best solution.

While it is possible to seek approval for operations “within Mongolia ” or other large

non-specific geographical areas, the operator will need to outline how it will go about ensuring it is aware of any local airspace restrictions and/or other localised operating conditions.

**102.11(b)(4) Hazard register:**

This rule requires you to complete and provide a hazard register. This register should be tailored to the risk of the operation, with appropriate mitigations identified. The inclusion of a documented method for identifying hazards, and controlling the associated risks will provide confidence, that the intending operator understands the context of their operations, and applies the standards that are likely to produce the best safety results. Consideration should be given to how you collect the information and how you disseminate the plan to manage, and minimise hazards to your personnel, including their role in any hazard mitigation.

The hazard assessment process should consider all phases of operation, including hazards associated with the launch and landing.

**102.11(b)(5) Reporting information:**

The rule contemplates that you will have procedures to report accident and incidents.

Currently, Part 12, which details reporting requirements for manned aircraft, does not apply to unmanned aircraft. The Director is instead able to tailor a specific reporting framework on a case-by-case basis.

Until a fit-for-purpose reporting mechanism is put in place, intending operators will be required to report certain accidents and serious incidents in a manner consistent with Part 12.

CAA005 Occurrence Report (<http://www.mcaa.gov.mn/Forms/CA005> Form) should be used as the reporting mechanism. Many sections of the form are unlikely to be applicable (in which case they should be left blank), but using the form will ensure consistency in the CAA reporting system.

You will generally be required to report the following types of events—

- injury to persons; and
- loss of control; and
- fly-away; and
- motor or structural failure; and
- incidents involving manned aircraft; and
- incursion into airspace where not authorised; and
- damage to third party property.

If you are unsure whether to report or not we encourage you to err on the side of reporting.

You may also be required to undertake regular statistical reporting which, when linked with

incident reporting, provides data for CAA to determine the reliability of unmanned aircraft. The more data gathered, the sooner reliability can be established which could inform policy work to revise limitations applied to unmanned aircraft operation.

#### **102.11(b)(6) Licensing and qualifications:**

This rule relates to operating requirements for personnel licensing, qualifications, training and competency. There are currently no internationally recognised standards for unmanned aircraft competency and qualification requirements. The Mongolian Civil Aviation Rules also do not prescribe any particular pre-requisite for the operation of an RPAS.

The rule contemplates the Director being satisfied around two key areas of knowledge and competence—

- (1) general aviation knowledge (incorporating such things as airspace and air law); and
- (2) specific knowledge to remotely pilot aircraft/unmanned aircraft (including aircraft handling).

In assessing what qualification and/or knowledge may be required for personnel involved in a particular operation, the CAA will need to be satisfied as to the person's knowledge and competence. Generally, a qualification or pilot licence will be evidence of this.

All assessments will occur in the context of the role the person will be performing, and the nature and scope of the operation in which they are involved. This includes people performing the following types of roles—

- pilot-in-command; and
- control station attendants; and
- observers.

#### ***Pilot in command and persons having control***

To be approved as a person having control and/or the pilot-in-command of an RPAS under a Part 102 certificate, it is expected that the relevant person possess both general aviation knowledge and RPAS specific competence.

Unless the nature and scope of the operation require otherwise, the following are likely to be acceptable to demonstrate general aviation knowledge—

- a pilot licence issued under Part 61, or recreational micro-light or glider pilot certificate issued by a Part 149 organisation:
- a remotely piloted aircraft licence (or equivalent) issued by a competent foreign aviation authority acceptable to the Director:
- a pass in the private pilot licence (PPL) air law exam; flight radio telephone operator
- (FRTO) exam; an FRTO rating<sup>2</sup>; five hours of air experience focussed on airspace and flight radio use:
- a certificate of achievement issued by a Part 141 training organisation, which

indicates—

- a pass in aviation law theory; and
- competency in operating unmanned aircraft; and
- competency in the use of aviation radios (if applicable).

Unless the nature and scope of the operation require otherwise, the following are likely to be acceptable to demonstrate RPAS specific competence—

- a Mongolian Aeromodel Sport Association (MASA) wings badge relevant to the type of unmanned aircraft (e.g. fixed-wing, helicopter, multi-rotor);
- a certificate of training (or equivalent) from the manufacturer of the unmanned aircraft to be operated,;
- a certificate of training from a Part 141 training organisation authorised to conduct unmanned aircraft training.

We expect there to be growth in the number of organisations delivering RPAS training courses. For these to be considered for acceptance, an operator will need to obtain and supply a copy of the course syllabus, which will then be considered by the CAA.

For other personnel involved in an operation, the CAA will consider each application on its merits.

General guidance is provided below.

### ***Observers/support crew***

Observers should not be impaired either visually or aurally in any way other than by an impairment that can be simply corrected (e.g. with prescription glasses).

Unless the nature and scope of the operation require otherwise, observers will generally be expected to demonstrate competence in at least the following areas—

- methods of communicating with the pilot both directly; and
- action and backup action to take if communications fail; and
- methods of division of the sky into sectors so any intruder's position is instantly known once reported to the pilot; and
- emergency procedures should any event take place.

Support crew tasked with providing crowd control will be expected to demonstrate, that they are trained and authorised by the operator. Support crew should wear appropriate high visibility jackets.

Once certificated, observers and support crew should be trained and authorised in writing by the operator. A record of any ongoing training and specific site authorisation should be held by the operator and the crew member concerned.

### ***Flight time recording and operational experience***

The following is recommend guidance only. Unless it is made a condition of a Part 102 certificate, the following is not mandatory.

Pilots and other related personnel should maintain a logbook recording their flight time and operational experience. The logbook should record at least—

- the pilot's/crew member's name; and
- aircraft type and serial number (if it has one); and
- flight time; and
- purpose of the flight; and
- outcome of the flight; and
- operational flight or training flight details.

The logbook can be in paper or electronic form but should be able to be produced when requested by the Director.

Maintaining these records is not mandatory but highly recommended and will be useful when seeking to renew a Part 102 certificate and/or, when applying to change or increase the scope of an operation under an existing certificate.

#### **102.11(b)(7) Details of aircraft to be used:**

The CAA would expect to see the following information provided with an application—

- format of the aircraft (rotorcraft/fixed-wing); and
- the dimensions and weight (ready to fly); and
- identification of the manufacturer of the aircraft, or if it is a homebuilt RPAS, the identity of the person who constructed it and when; and
- any attachments or role equipment fitted; and
- any unique markings or identifications, including the primary and any secondary colour of the aircraft.

If the Director, having given due consideration to rule 102.13(b)(3), requires marking in accordance with Part 47, guidance will be found in advisory circular AC47-1 [http://www.mcaa.gov.mn/Advisory Circulars/AC047 1.pdf](http://www.mcaa.gov.mn/Advisory%20Circulars/AC047%201.pdf) .

If Part 47 compliance is not required, then the expectation is that the aircraft will be marked using a permanent label that clearly identifies the operator.

Unless due to the size or nature of the aircraft necessitates otherwise, the CAA would expect that the aircraft is marked in a way that identifies the operator. The marking should be affixed in a location that can be read without removal of any cover. The label size can be scaled to suit the size of the aircraft.

#### **102.11(b)(8) Control systems:**

The rule requires the control system to be identified and approved. Currently, there are no internationally recognized design standards or configuration requirements that apply to

unmanned aircraft control systems.

The command and control link refers to the data link between the RPA and its remote pilot station for the purposes of managing the flight. Work is progressing internationally by the Radio Technical Commission for Aeronautics (RTCA), to develop standards in this area, but this is yet to be completed.

In the interim, caution is necessary in regard to reliability of C2 links, including the potential for jamming or other interference. Because of this, large unmanned aircraft utilizing this technology are unlikely to be acceptable, unless an operator can demonstrate that these issues have been resolved.

For unmanned aircraft that are likely to operate in Mongolia, the evaluation of the C2 link will be carried out on the basis of an operating history. The availability of good operational history should be considered when determining to use a particular RPAS model/type.

#### **102.11(b)(9) Aircraft maintenance:**

The rule requires you to establish a maintenance programme that is acceptable to the Director for all aircraft you operated. The maintenance programme should reflect the nature of the operations the aircraft is applied to, and the size and complexity of the aircraft itself. This programme should be based on the manufacturer's maintenance instructions and should cover at least—

- a pre-flight inspection instructions or checklist; and
- a post-flight inspection instructions or checklist; and
- a periodic (i.e. regular) scheduled inspection timetable; and
- details of any component finite or retirement lives; and
- actions in regard to service information or airworthiness directives; and
- person(s) responsible for maintenance on the aircraft; and
- damage tolerance criteria (i.e. when components such as propellers must be changed).

Details of all maintenance actions will generally be expected to be recorded in an aircraft logbook.

The following describes levels of maintenance performance that are likely to be acceptable under a Part 102 certificate.

#### **Large unmanned aircraft**

For large unmanned aircraft, maintenance conducted by a Part 66 qualified, rated, licensed aircraft maintenance engineer (LAME), will generally be acceptable. Maintenance performed by a Part 145 maintenance organisation is also likely to be acceptable.

Maintenance performed by manufacturers of large unmanned aircraft is likely to be

acceptable, but evidence of any maintenance programme applied by the manufacture would need to be supplied for approval. Manufacturers of large unmanned aircraft may provide maintenance support and training to operators; you may wish to provide evidence of any such training to be approved to perform certain maintenance on an aircraft.

Those aircraft that, but for the absence of a pilot, would generally be issued with an airworthiness certificate would likely be required to undergo the standard certification process provided under Part 21.

### ***Medium and small unmanned aircraft***

Maintenance on small and medium size unmanned aircraft is generally considered to be the responsibility of the operator.

Small and medium unmanned aircraft manufacturers may only supply basic maintenance instructions in the form of a handbook or instructional manual. Operators will be expected to reflect any operating manual guidance, and limitations in their maintenance programme and exposition.

### ***Battery maintenance***

Battery maintenance is important with both electric-powered and conventionally powered unmanned aircraft utilising on-board electronics. Operators should develop good maintenance practices in regard to battery packs, including monitoring their performance and removing from service packs, that indicate a loss of performance before they fail. Battery maintenance on lithium polymer ('LiPo') batteries is important as these can be very dangerous if not monitored carefully and treated with respect.

When transporting LiPo batteries to an operational site, best practice for handling and transporting dangerous goods should be followed and all recommended precautions carried out, including the use of safe bags etc.

### **102.11(b)(10) Operational procedures:**

The rule requires you to ensure that all operational procedures related to proposed flights need to be documented. This could include but is not limited to—

- how you determine meteorological limits; and
- how you operate the aircraft regarding pilots; and
- camera operator and the links between observers; and
- preflighting aircraft; and
- communications between personnel; and
- how you ensure minimum distances between persons and/or property.

In manned aircraft operation, these are called “standard operating procedures” (SOPs), and this is a good term to use. Refer to the general guidance material found in the front section of

this advisory circular for additional advice.

The manufacturers operating guidelines and any limitations specified, provide a useful starting point for the establishment of operating procedures.

**102.11(b)(11) Cargo-handling and dropping of items:**

This rule is intended to capture additional operating configurations in respect of the carriage of cargo or the dropping of items. Where an operator intends to move cargo or drop items or conduct agricultural operations or any similar operation, procedures should be developed to ensure the operation can be conducted with out harming persons or property. These procedures should also be tested against your risk assessment processes. The established procedures should be added to the SOPs.

**102.11(b)(12) Construction and design of unmanned aircraft:**

Currently, there are no internationally recognised design standards, configuration requirements or airworthiness certificates that apply to unmanned aircraft. Work has been undertaken by ASTM in the United States, on design standards for small unmanned aircraft. Some initial standards have been developed and can be found here.

These standards provide good guidance material for intending operators, and may assist with aircraft selection.

The CAA will undertake initial airworthiness assessments on a case-by-case assessment. The CAA's assessment will consider whether the aircraft has been designed and constructed to an appropriate standard or level, and whether it is suitable for the proposed operations to be conducted, equipment used, or payload carried.

An assessment for the UAOC will consider the design standard that is most appropriate for the size and weight of intended aircraft.

The CAA will consider any manufacturer documentation, including any operations manual and limitations and/or any information about the standards, to which the aircraft has been designed and constructed.

Other factors relevant to the CAA's assessment will be—

- the proposed use of the aircraft; and
- the type, complexity, size and nature of the aircraft; and
- whether the CAA is familiar with the manufacture and/or model of aircraft; and
- whether the aircraft is the first of its kind in Mongolia ; and
- any operating history of the specific aircraft, or aircraft model/type; and
- any overseas certification or approval for the aircraft model/type; and
- accident or incident statistics in Mongolia or overseas.

Until the development of more comprehensive and widely-accepted standards,



fit-for-purpose testing and/or proving may be required and assessed on a case-by-case basis.

For fixed-wing aircraft, the use of a wing and tail-plane static load test is simple to carry out and would aid and substantially satisfy structural assessment.

Any aircraft that holds type certification that is to be modified for RPAS use would be expected to maintain (as appropriate) its type-certified status, and continue to meet ongoing regulatory maintenance requirements.

Unmanned aircraft the same size as microlight aircraft would be treated in a similar manner to manned microlight aircraft. The CAA may use international standards to guide its assessments;

Operators of larger aircraft should look to the standard FAA and /or European EASA design requirements as appropriate. CAA recommends that any persons intending to operate very large unmanned aircraft, contact the CAA prior to applying any such standards for guidance.

### **Availability of safety redundancies**

The carriage of a flight termination parachute is considered a highly effective safety redundancy, and is a means by which an operator may demonstrate mitigation of key hazards associated with the operation of unmanned aircraft, particularly in respect of managing the risks of flight over property and people. A flight termination parachute not only allows for a number of recovery efficiencies, but provides an emergency backup that can give confidence to the Director in risk mitigation. These parachute systems are now becoming available to the multi-rotor market as well, and should have a high priority for installation.

### ***Test/proving flights***

The CAA may, until design standards become available, require operators to conduct flight testing or proving flights to demonstrate safety of flight, controllability, and reliability. As part of the application process, an applicant may be required to demonstrate an operating history in a test area that demonstrates reliability, controllability and safe flight characteristics. To meet this requirement, and future statistical reporting requirements, an operator should ensure that accurate aircraft logbooks are maintained for each unmanned aircraft that is flown, including during any testing or proving flights.

Logbooks should record at least the following information—

- aircraft identification by model and serial number; and
- engine identification by type, model, and serial number; and
- propeller/s fitted by size and type; and
- ground control station in use by manufacturer, model and serial number; and
- defects and rectification details including component change details; and

- time in service of aircraft and components; and
- retirement lives of any finite or overhaul required items; and
- any relevant airworthiness directive or other manufacturer's service information tracking details; and
- purpose of flight and area flown; and
- identification of pilot in command; and
- control system for any out of phase maintenance if appropriate e.g. servo replacement; and
- records of all maintenance inspections carried out and by whom; and
- records of any modification made to the design, structure, systems or controls of the aircraft; and
- any other data required on a case-by-case basis.

#### **102.11(b)(13) Amendment and distribution of exposition**

For this requirement, the applicant needs to have a process for amending the exposition. Controlling the exposition is done by the use of a list of effective pages (LEP), and a page allowing a chronological record of amendments incorporated into the exposition. The amendment process should have a control sheet that tracks the amendment process. This may, for example, include—

- need for amendment; and
- whether the amendment needs prior approval by CAA (see rule 102.23); and
- acceptance of the amendment (by prime person); and
- update of LEP and amendment page; and
- distribution to manual holders (including CAA).

#### **102.11(b)(14) Approvals**

This requires the operator to identify any approvals issued that are associated with the operation. For example, you should provide evidence of any approvals on which your operation may rely, such as a DOC concession, contracts or evidence of approval from affected property owners.

#### **102.11(c) Adopt by reference**

The applicant may propose that certain parts of the operation would be conducted in accordance with the requirements of any Civil Aviation rules as a means of managing the risks. For example, the applicant may use a rule number and any appropriate clause as a reference to a means of compliance, avoiding the requirement to describe in detail the full rule requirement.

#### **102.11(d) Director's discretion**

This rule allows the Director to vary the exposition content required, proportionate to the kind of operation the applicant has requested. This would allow the Director to tailor the initial

application requirements of an applicant to reflect the risk and complexity of their operation. For example, an operator may intend to operate entirely within Part 101, but is seeking an UAOC as a requirement for obtaining insurance for their operation. The Director may decide that, given the operation is within Part 101, the applicant's exposition need not be as comprehensive as all the matters covered under rule 102.11(a). Essentially, the Director can scale the applicant's exposition requirements in line with the risk posed by the operation.

### **102.13 Grant of a certificate**

This rule enables the Director to issue an operating certificate in accordance with the Civil Aviation Act 1999, providing he is satisfied all criteria have been met. The Director may require additional procedures added to the certificate holder's exposition, or impose requirements or conditions on the certificate holder's Operation Specifications attached to the certificate.

Additionally, anyone holding or applying for an aviation document must satisfy the Director they are a fit and proper person (FPP). An aviation document includes, for example, a licence, rating, or air operator certificate. An UAOC is an aviation document. The FPP process is explained below.

As part of an application for a Part 102 certificate, the primary person required by rule 102.11(b)(i) will be required to undergo FPP assessment. The Director may also require the pilot-in-command, and other personnel involved in an operation to undergo a fit and proper person assessment.

#### ***Fit and proper person***

Fit and proper person assessments are made on a case-by-case basis. The relevance and weight given to any particular matter (or information), however, may vary depending on the document that has been applied for (i.e. the level of involvement in the aviation system). It is entirely possible that a person may be fit and proper for one level of involvement in the civil aviation system, for example, to hold a private pilot licence, but not fit and proper for a higher level of involvement in the system, such as holding a commercial pilot licence or a senior person position.

The criteria for the fit and proper person test must be, and include—

- the applicant's conviction record for transport safety offences; and
- the applicant's experience in the transport industry; and
- the applicant's knowledge of aviation regulatory requirements; and
- the applicant's history of compliance with transport safety regulatory requirements; and
- the applicant's history of physical or mental health or behavioural problems.

The fit and proper person application form (24 FPP) can be found on the CAA website, and requires the applicant to provide a criminal offence history from the Ministry of Justice and transport offence history record. These records can take some time to obtain and should be requested as early as possible in the application process.

### ***Aviation safety***

This rule also prohibits the Director from issuing a certificate if its issue would be contrary to aviation safety. In other words, the issue must not have an adverse impact on aviation safety. This is in regard to all aviation safety so the impact on the manned aviation system from the proposed unmanned aircraft operation must be assessed.

Hazards are circumstances that could lead to—

- injury to people in the air or on the ground; and
- damage to property including other aircraft in the air or on the ground; and
- disruption to the Mongolia civil aviation system; and
- creating a situation where other airspace users are subjected to taking action that could endanger their flight operations; and
- flights over sensitive areas such as power substations, dangerous storage areas, prisons, etc.

### **102.13(b)(1) Requirements**

This rule provides for the Director, when issuing a certificate, to apply any requirements he or she considers are necessary having regard to the complexity of the operation.

As a general rule, it can be assumed that additional requirements will be proportionate to the size and complexity of the unmanned aircraft operation, and any similarity with manned aircraft operations.

This, for example, could be the requirement to have the operator provide a maintenance programme approved under rule 91.609 for any large complex RPAS they may operate.

### **102.13(b)(2) Conditions**

This rule provides for the Director, when issuing a certificate, to apply any conditions he or she considers are necessary having regard to the complexity of the operation. The range and scope of unmanned aircraft operations is so vast, that the decision on which conditions would apply to a specific operation can only be made once an application is received. As noted above, in rule 102.11(c) the applicant may propose that the operation would be conducted in accordance with the requirements of any Civil Aviation Rules, as a means of managing the risks.

On this basis it can be assumed that for small and medium unmanned aircraft, the rules will generally not apply and the guidance material published earlier in this advisory circular will

fill that role.

Agricultural operations are one exception due to the hazardous nature of chemicals carried, and it would be expected the relevant aspects of Part 137 would be reflected as conditions on the UAOC.

### **102.13(b)(3) Markings**

This requirement for the Director to determine if marking under Part 47 is required has been covered in rule 102.11(b)(7). While there is no simple delineation criteria, larger aircraft that have surface areas that will allow compliance with Part 47 may be subject to this requirement. The majority of the current RPAS have structures that simply do not provide area for compliance with Part 47. In these cases the operator will need to apply, somewhere on an external surface, a permanent label clearly identifying who the operator is.

### **102.15 Operations specification**

Upon completion of the assessment, the CAA may decide to issue an unmanned aircraft operator certificate. This will include the issue of an operations specification that clearly stipulates the privileges and type of operations, that are authorised and any conditions imposed in the interest of aviation safety.

You do not need to prepare the operations specifications. This is a document that is produced by the CAA. Your role is simply to ensure that your application includes all of the information that is needed to create an operations specifications.

The conditions contained on each operators' operations specifications are likely to vary depending on the kind of operation and the aircraft used, although some conditions may be common across all certificates.

### **102.17 Privileges of certificate holder**

Both rules 102.17(a) and (b) relate directly to the operations specification issued with the operator certificate, and simply point the reader to the operations specification to see the details of what is permitted. The rules further indicate that if the Director has specified on the operations specifications that an operator must comply with any additional rules, then they must do so even if the rule does not apply to remotely pilot aircraft as a matter of course.

### **102.19 Duration of certificate**

The rule provides that a certificate may be issued for a period of up to five years.

For first time applicants, the Director is likely to grant a certificate for a period of only two years.

This is to allow the Director/CAA to develop a relationship with the operator, and to cater for possible technology changes in the operating environment during the two year period. During the two-year period the CAA may conduct inspections and monitoring to assess your

performance.

If you currently hold a CAA (organisational) certificate, then CAA may issue a certificate with a five year validity period. This policy reflects the fact that the organisation has had an opportunity to demonstrate its capabilities in other areas of civil aviation, and that the Director can have confidence that the operator will behave similarly in exercising its privileges under the new certificate.

#### **102.21 Conditions of operation of unmanned aircraft**

This rule makes it clear that the certificate holder must comply with all rules under Part 101, except where the operations specification provides relief from or varies certain Part 101 rules.

It further requires the certificate holder to comply with their exposition, and any conditions imposed by the Director on the operations specification attached to the certificate.

Rule 102.21(b) makes it clear that the certificate holder is responsible for any other operator, or personnel conducting operations under authority of that certificate. He/she must ensure that these personnel are fully aware of the procedures in the exposition and understand the content, conditions, and limitations specified on the operations specification.

#### **102.23 Changes to exposition**

Procedures for the amendment of the exposition are required to be documented in the exposition (refer to rule 102.11(b)(13)). There are two types of amendment, those that require prior acceptance of the Director and those that do not. The procedure for each should be described in the exposition.

The application form for amendment (CAA24102/02) is separate from the initial application form and can be found on the CAA web site under Forms.

#### **102.25 Renewal of certificate**

The rule is self-explanatory; however to provide ample time for processing of the renewal application, you should make the application at least 60 days prior to the certificate expiry date.

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