Australian Government
Civil Aviation Safety Authority

ANNEX C TO AC 133-01 V4.1

PC3 sample exposition content

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Introduction

This sample exposition Annex has been created for a Part 133 operator using PC3 for their rotorcraft. This Annex will remain as part of the Advisory Circular until the CASR Flight Operations Sample Exposition/Operations Manual is updated. This content of this Annex constitutes an acceptable means of compliance (AMC) on the condition that the operator ensures the content is appropriate for their operational circumstances and rotorcraft.

Contents

Acknowledgement of Country

The Civil Aviation Safety Authority (CASA) respectfully acknowledges the Traditional Custodians of the lands on which our offices are located and their continuing connection to land, water and community, and pays respect to Elders past, present and emerging.

Artwork: James Baban.

1 PC3 Performance exposition AMC

1.1 Performance Class required

1.1.1 {Sample Aviation} rotorcraft are to be operated at all stages of a flight in accordance with the requirements for rotorcraft Performance Class 3 (PC3) as detailed in the following sections.

1.2 Adequate vertical margin

1.2.1 For obstacle clearance, the adequate vertical margin (AVM) is the minimum vertical distance from an object, as defined in the RFM. For{Sample Aviation} rotorcraft with a rotorcraft FM that does not specify a minimum vertical distance from an object, an AVM as follows will be used {delete not applicable dot point elements}:

- <2500 kg MTOW minimum AVM = 15 ft
- 2500 kg to 3175 kg MTOW minimum AVM 30 ft
- > 3175 kg MTOW minimum AVM 35 ft.

1.2.2 An obstacle need not be taken into account for an adequate vertical margin calculation if operations will permit safe manoeuvring to avoid the obstacle by a horizontal distance of at least 2 rotor diameters (2R-D).

1.2.3 Identification of obstacles

1.2.3.1 The PIC must assess the obstacle environment for any HLS to be used in their operations and identify any limiting obstacles and their associated obstacle-free gradients from data supplied by the heliport or aerodrome operator, quick reference data in this manual HLS register, or from estimates during pilot assessment using local maps, google earth or visual inspection.

1.2.3.2 For company operations, an obstacle is to be considered limiting if:

- it cannot be reasonably horizontally avoided by 2RD without excessive manoeuvring during the take-off; and
- its distance from the FATO and/or vertical extent is considered from pilot assessment to intercept the normal H/V envelope compliant take-off and initial climb flight path for the rotorcraft you are operating

  or

- its location and size will require a take-off procedure which will require entry to the avoid area of the HV envelope.

1.2.3.3 Once obstacles are identified the PIC must ensure the correct AVM requirements can be achieved for the operation.

1.2.3.4 Additionally, when assessing AVM obstacle miss capability in company operations, pilots must consider:

a. **Size of rotorcraft** – noting the closer your pilot's seating position is to the main and tail rotor tips, the more accurate your depth perception and judgement of distance from obstacles will be.

b. **Field of view** – when flying multiple types for {Sample Aviation}, for equivalent sized rotorcraft, the field of view may be more restrictive in one type compared to other types being flown. This may mean the ability to sight and judge potential objects is degraded to different extents in different types you are operating. In such cases, the use of larger AVM and horizontal margins are recommended, based on the most limiting type utilised for your operations on that day.

c. **Nature of obstacles** – distance judgement from large solid obstacles with well-defined edges and good colour contrast will be much easier compared with small, low-contrast obstacles, such as power lines or dead trees. When operating in places with these low-contrast obstacle environments company pilots must increase AVM and horizontal margins in these circumstances and look for tell-tail features such as power poles and other identifying features such as pump houses etc. before descent to, or departure from, a location using PC3 procedures.

d. Minimising time in the avoid area of the HV envelope - Company PC3 operations policy for obstacle avoidance is to minimise time operations are conducted in the avoid area of the HV diagram to the extent necessary to avoid a possible accident or incident during the departure from or arrival at the HLS

Note: This does not prohibit short duration PC3 operations in the avoid area of the HV diagram if they are necessary for the safe operation of the rotorcraft.

e. **Environmental conditions** – distance judgement in favourable conditions of light and visibility will be more accurate than in unfavourable conditions. When operating in low visibility and/or low light and contrast conditions pilots must -

   i. operate at safe airspeeds and altitudes for the conditions

   ii. increase AVM vertical and baseline horizontal separation from obstacles to ensure continued separation in PC3 operations

   iii. if unsure of the obstacle environment do not depart or descend to arrive until conditions improve, or if necessary, divert to a suitable alternate destination.

1.2.4 HLS operating site approach and landing general procedures

1.2.4.1 On arrival above the site, after confirming wind direction and before commencing an approach to a landing, the PIC must be satisfied this its obstacle environment will permit safe PC3 operations.

1.2.4.2 At non-regular use or unfamiliar HLS, company PICs must conduct an airborne recce which confirms the adequacy of the data gathered in the pre-flight planning phase of the flight and which considers:

- **Size**: The FATO is adequate at least 2D, or larger if necessary for operations into the site.
- **Shape**: The site accommodates the approach, go-around, touchdown and lift-off area and departure route with due regard to PC3 operations.
- **Surrounds**: Any obstacles are "as briefed" and have been identified and do not infringe the approach or departure flight path. SFLA's (if any) are identified and considered on the basis of helicopter circuit position and wind direction.
- **Surface**: The surface appears satisfactory and is free from debris that may damage the helicopter, and the ground is able to support a safe landing.
- **Slope**: Any slope is within the helicopter’s limits.
- **Downwash**: Considering wind direction and approach flight path, confirm downwash will not pose a risk to third parties on the ground or damage to buildings or property and not cause FOD to be blown or lifted.

1.3 Populous area procedures

1.3.1 An area may be considered to be populous if it has the following characteristics:

- sufficient population density so that if a failure occurred, the flight would pose a risk to persons or property on the ground

  or:

- is a city or a town.

1.3.2 The pilot must, to the greatest extent possible within the constraints of the proposed route, plan the flight path so that a suitable forced landing area (SFLA) is available within gliding range.

1.3.3 If an SFLA is not likely to be continuously within glide range the pilot must conduct a risk assessment for the sections of flight over populous areas in accordance with section XXXX {insert company reference} Risk Assessment. If the risk assessment indicates the flight can be undertaken, the pilot shall:

- review the proposed route to determine if a glide to any SFLA can be achieved using the SFLA assessment policy outlined in section 2.4, and:
  - select tracks that have clear areas or overfly non-populous areas
  - plan to fly the shortest route between suitable SFLA's
  - where feasible, plan to operate at altitudes and speeds that maximise the ability to glide clear of populous areas.

1.3.4 For a take-off and initial climb, or approach and landing or baulked landing stage of flight to an aerodrome which is not an aerodrome which is normally used for regular day to day operations of aeroplanes the rotorcraft must:

- be able to glide to an SFLA should an engine failure occur
- be operated in the avoid area of the HV envelope for the minimum time required to avoid an accident or incident, including avoiding close proximately obstacles in the flight path

  or

- meet the requirements of section 10.26 of the Part 133 MOS.

Notes:

1. The execution of a safe forced landing at an SFLA may not be possible if a failure occurs when operating in the avoid area of the HV diagram.
2. All {sample aviation} rotorcraft are fitted with main and tail rotor gearbox chip detectors with associated cockpit caution lights.

1.4 Assessment of suitable forced landing areas

1.4.1 When reviewing areas which could be used as suitable forced landing areas, the pilot should consider the following.

1.4.2 SFLA over land

- Surface smooth and firm enough to facilitate arrival speed.
- Slope within limits for rotorcraft.
- Size of area to accommodate rotorcraft.

1.4.3 SFLA on water

1.4.4 A SFLA on water is only to be considered if:

- the rotorcraft assigned for the flight has emergency flotation fitted
- the PIC rostered for the flight was found competent at their last proficiency check in the use of the emergency flotation system fitted to the rotorcraft and in ditching procedures. This may be gained by an oral assessment with a training and check pilot.
- The rotorcraft must be able to ditch in the area of water with a reasonable expectation that there would be no injuries to persons in the rotorcraft or on the water. Company policy is that this is only viable in sea states of less than XX (insert operator limit).
- There must be a reasonable expectation that persons in the rotorcraft would survive in the area of water for the time that it would take to rescue the person. As such {Sample Aviation} only considers this is possible if
  - each passenger is wearing a life jacket and has received instruction in its use prior to departure
  - the PIC must have contacted company operations (phone insert number) and advised an overwater SAR time commencement and completion time, when the SFLA on water may be required

  or

  - if this is not possible the PIC must ensure local SAR capability is available their contact number must be loaded in the PIC mobile phone.
- For passenger transport operations – the area of water must be:
  - adjacent to land

  or

  - Adjacent to an offshore installation to which the company is operating with search and rescue capabilities, which has been contacted by the company and has been advised they will provide SAR capability if needed.

1.4.5 The sea or other area of water temperature is below 18 degrees Celsius must not be used as a SFLA unless approved by the HOFO and additional survival processes (such as survival suits, appropriate training for crews and passengers, or rapid response onsite SAR availability) are instigated.

1.4.6 Emergency flotation system operating, and sea state limits must not be exceeded for any water SFLA.

1.5 Maximum operational passenger seating capacity

1.5.1 All {Sample Aviation} aircraft operations are conducted with a maximum operational passenger seating capacity (MOPSC) of nine or less, dependant on rotorcraft type being operated.

1.6 Operation flight rules

1.6.1 All {Sample Aviation} air transport operations are conducted by day under the VFR.

1.7 Take-off and approach performance

1.7.1 General

1.7.2 For any {Sample Aviation} PC3 operation, the pilot must determine, pre-flight, the most limiting weight for the intended operation.

1.7.3 The most limiting operational weight will be the lowest weight determined after considering;

- the take-off or landing space available at the departure or destination HLS
- the weights, altitudes and actual or forecast temperatures likely to exist during the operation
- forecast or actual wind direction and strength
- the type of take-off and the type of landing procedure required for the operation
- whether the operation requires HOGE capability.

1.8 Procedures for take-off and approach performance calculation

1.8.1 The PIC must determine from the RFM that the weight of the rotorcraft does not exceed the maximum weight specified for the type of take-off, approach procedure and landing to be used, and to achieve:

a. a hover in ground effect (HIGE) in the prevailing conditions, within take-off or landing power settings

or

b. a hover out of ground effect (HOGE) if the terrain precludes HIGE

c. a margin of (insert operator required margin) from the HIGE/HOGE power requirement to transition to forward flight for the selected profile

d. a baulked landing from any point in the approach path

e. clearance of all obstacles by the adequate vertical margin in the take-off and approach phase.

1.8.2 The PIC must determine the performance of the rotorcraft meets the requirements of the specific operation from the RFM.

1.8.3 The PIC must take the following into account when calculating the weight as described at 1.8.1:

a. the pressure altitude and temperature from an authorised report

b. wind speed and direction from an authorised report factoring a safety margin of 50% of any headwind component over 5 knots or 150% of tailwind component if the RFM permits tailwind operations.

1.8.4 The pilot must also -

a. determine the take-off distance available from published data, company surveyed data or pace out the FATO plus safety area to ensure a minimum of 2D dimension is available. If this information is not available, use common measures, such as football field or house size to assist with distance judgement and ensure a minimum of 2D dimension is available

b. identify the shallowest obstacle free gradient that utilises an into wind advantage for the take-off and initial climb stage of the flight that also avoids creation of a hazard to persons or property

c. determine from the RFM or company-based data that the rotorcraft is capable of achieving the required gradient for the given weight and ambient conditions and can achieve obstacle clearance in the event of a baulked landing

d. identify the location of reasonably useable SFLAs beyond the FATO and along the selected flight path

e. assess the slope of the departure and planned destination aerodromes and any alternate aerodromes or planned SFLA’s so as not to exceed the RFM slope limitations

f. ensure the landing and take-off profiles are planned to remain outside the avoid area of the HV envelope, except if such operations are necessary to avoid and accident or incident. In such cases operations in the avoid area must be minimised to the greatest extent practical within the safety objectives of the operation

g. ensure the landing and take-off profiles are planned to minimise the potential impacts or rotor downwash and outwash on persons and property at the departure and destination sites

h. prior to descent below obstacles, ensure that the rotorcraft engine is supplying a power margin of (X° Torgue) (X" MAP) in relation to requirements to HIGE or HOGE.

1.9 Quick reference PC3 performance data

{Place known operator-based quick reference performance data (if any) for rotorcraft types utilised here. This may be added in tabular form specific to each type and model of rotorcraft over a range of weight, altitude and temperatures as necessary. Otherwise reserve this section}

1.10 Take-off and approach procedure

1.10.1 Pilots will select take-off and approach paths that:

a. take into account the items mentioned in section 1.7

b. complies with the RFM procedures and limitations

c. provides the best combination of:

   i. a suitable forced landing area

   ii. into wind

   iii. minimum power required

   iv. avoidance of hazards to persons or property.

d. maintains the obstacle clearance and SFLA requirements as specified in sections 1.2, 1.11 and 1.12.

Note: These procedures apply from the take-off surface until the minimum height above obstacles - 500' or 1000ft as applicable and from these heights until the landing surface.

1.11 En route SFLA availability policy (any company PC3 operation)

1.11.1 Pilots must operate the rotorcraft in a way that minimises the time the flight is outside the range of an SFLA. Where a proposed route will overfly areas where SFLA's are few or non-existent, the pilot will plan the route to pass near any SFLA's available to would reduce the exposure if encountering emergencies that require an immediate or precautionary landing.

1.11.2 Operating in areas of mixed terrain features

1.11.2.1 A pilot may elect to fly directly above surfaces that do not continuously allow for an SFL. This should be at an appropriate height above ground level where sufficiently flat, open areas are within autorotational gliding distance.

1.11.2.2 Pilots who are not sure if a planned route will comply with this policy must discuss their flight plan with the HOFO or their nominated delegate to ensure correct application of this section.

1.11.3 Operating in areas with scattered SFL areas

1.11.3.1 Pilots will adapt the flight path to remain as close as possible to any available SFLA's, without significant deviation, using the following processes if applicable:

a. climbing before crossing a lake or other water feature

b. flying around a stretch of heavily treed or steep terrain

c. a combination of lateral and vertical avoidance of unsuitable terrain where possible.

1.11.3.2 Significant deviation of the flight path is considered to cause more than 5 minutes overall additional time to be added to the route, or any deviation which may significantly affect the fuel plan for the flight.

1.11.4 Operating in areas where an SFLA is not available within autorotational distance

1.11.4.1 In some cases, it may not be feasible to change the flight path to maximise the potential for a SFLA to be available.

1.11.4.2 Flights over such areas are permitted if a risk assessment concludes that the identified mitigators and controls to be applied will provide at least an acceptable level of safety. Pilots must engage with the HOFO to carry out a specific risk assessment in accordance with the procedures in section {insert reference}.

1.11.4.3 Operational risk assessments as detailed in section {insert reference} must be reviewed and signed off as acceptable by the HOFO or their assigned delegate prior to the flight.

Note: The HOFO may only delegate this task to the deputy HOFO or the HOTC.

1.11.4.4 {Sample aviation} regular scenic routes use predetermined flight paths and altitudes that maximise SFLA availability. Pilots must adhere to the standard route and minimum altitude where possible as detailed in {enter methodology by which this is promulgated, i.e. maps in the flight preparation area, pilot route guide, navigation database of the aircraft etc.}.

1.11.4.5 When operating in any area, particularly in remote and isolated areas, outside the range of an SFLA, pilots must have the company SAR response number readily available for use after any emergency situation.

1.11.4.6 Pilots must reassess the suitability of their planned flight path immediately before departure to assess the possible effect of adverse environmental conditions expected during the flight that may affect the glide range to the SFLA's that were notionally available at the pre-flight stage. These conditions include;

a. Low cloud base

b. Wind component along the intended flight path

c. Density altitude

1.12 En-route obstacle clearance - avoidance of creation of a hazard

1.12.1 Operations in populous areas and public gatherings

1.12.1.1 Except in an emergency, or during take-off and landing, pilots must avoid creating a hazard by remaining at least 1000' above the highest obstacle within a 300m horizontal radius from the rotorcraft.

1.12.2 Operations in areas that are not populous

1.12.2.1 Except in an emergency, or during take-off and approach, pilots must avoid creating a hazard by remaining at least 500' above the highest obstacle within a 300m horizontal radius from the rotorcraft.

Note: Refer to sections (insert reference) for {sample aviation} preferred take-off and Approach procedures.

1.13 Risk assessment

1.13.1 For operations flying in PC3 over a populous area, risk assessment and risk management procedures must be completed as detailed in section {insert reference}.

CASA Note to operators:

The CASA sample manual has AMC for these risk assessments in section 2.9 subsection 2.9.5 if needed for your exposition content.