Australian Government

Civil Aviation Safety Authority

Regulatory Policy – CEO-PN029-2005

Multi-Engine Helicopters Operational Performance Standards

Sponsor:	Group General Manager, General Aviation Operations Group
Policy Issue No:	Two
Policy Issue Date:	July 2005
Policy Review Date:	June 2006
Regulatory Provision:	CAR 235

Reason for the Policy

CAR 233
CAR 235

CAR 233 requires the pilot-in-command to ensure that the loading of his or her aircraft complies with the directions specified by the Authority in CAR 235 which, amongst other requirements, stipulates that weight determinations shall take into account:

- The kind of operations to be carried out
- The performance of the aircraft in configurations in which it is likely to be flown and with faults that are likely to occur.

CAO 20.7

CAO Part 20, Section 20.7 amplifies these requirements for the various categories of aeroplanes but there is no parallel legislation for helicopters. Performance standards for Australian-registered multi-engine helicopters have for some time been incorporated in flight manuals during the certification process but with changes to flight manual management procedures, Airworthiness Standards Branch no longer exercises control over the content of flight manuals and the practice has ceased.

The purpose of this policy statement is to promulgate the means by which the minimum level of performance required for the conduct of operations by Australian-registered multi-engine helicopters is to be published. This statement constitutes CASA's policy in this area pending promulgation of the relevant legislation.

Policy

The operator of an Australian-registered multi-engine helicopter must ensure that the aircraft flight manual folder contains an operational supplement detailing the performance standards contained in this policy.

CAAP 54-1

Note: Civil Aviation Advisory Publication (CAAP) 54-1, Flight Manuals for Individual Aircraft, set out the method of providing operational performance data in an aircraft.

Performance Standards

The operational performance standards specified in this statement were developed in cognisance of the following:

- Single-engine failures in multi-engine helicopters, although not a common occurrence, are statistically predictable and operations can and should be scheduled to minimise the danger to persons in the aircraft and to other persons or property on the ground in this event
- Other mechanical malfunctions such as tail rotor, transmission, combining gear box or main shaft failures may be considered as relatively remote occurrences and cannot practically be scheduled into operational standards
- It is not current manufacturing practice to produce helicopters which have full one engine inoperative (OEI) accountability within the full flight envelope
- The airworthiness certification standards of the major manufacturing countries do not call up comprehensive OEI performance data particularly for 'normal category' (below 6,000 lbs) helicopters
- Multi-engine helicopters with a measure of OEI accountability, eg, with stay up ability en-route, are obviously safer than single-engine helicopters of comparable size and should not be unduly penalised when engaged in similar operations.

The highest available single-engine power rating is used to determine OEI performance. This rating is either:

- For take off or landing below Vyse – maximum OEI power authorised in the rotorcraft flight manual

- For operations in IMC and for operations other than take off or landing below Vyse – the 30-minute power (FAA) or intermediate contingency (CAA) limit.

Where multi-engine performance standards require full OEI accountability, Category A (FAA) or Group A (CAA) flight manual performance data must be available in order to demonstrate compliance with minimum climb gradient requirements. Climb performance requirements are presented at Table A Climb Rate and Table B Climb Rate Gradient see Attachments A and B. Gross performance data may be used to demonstrate compliance.

In the absence of suitable flight manual performance data, operators may apply to CASA for approval to use performance data, which has been validated in a manner acceptable to CASA.

For operations from/to helicopter landing sites (HLS) located within cities, towns or populous areas, the pilot-in-command should assess the potential risk of danger to persons or property on the ground which would result from failure of an engine and plan the flight so as to minimise that risk.

For passenger carrying CHTR operations from/to helicopter landing sites (HLS) located within cities, towns or populous areas, provision shall be made for suitable OEI forced landing areas following engine failure before critical decision point during take-off or after landing decision point during an approach.

In addition, for RPT operations by normal category, multi-engine helicopters, provision for suitable OEI forced landing areas shall be made regardless of whether the HLS is located within a city, town or populous area or not.

Full OEI Accountability. Full OEI accountability requires the ready availability of an OEI landing area following engine failure or adequate performance following engine failure, which assures continued safe flight.

OEI landing areas. An area may be selected as an OEI landing area if it has:

- A smooth, level surface
- An obstacle free approach gradient of 5 degrees from 500ft agl to touchdown
- Two directions of approach not less than 150O apart
- A strip width of at least 30 metres
- Landing distance available in accordance with requirements of the rotorcraft flight manual for OEI landings.

Maximum Allowable Weight. In determining maximum allowable weight for any phase of flight in accordance with this standard, allowance may be made for fuel burn-off.

Performance Standards – Passenger Carrying Charter Operations – All Weights

VFR

Take Off/Take off Climb. The maximum gross weight for take off is limited to that at which, in the ambient conditions, the helicopter can maintain a zero gradient of climb at 500 feet above the take off level in the OEI configuration. No OEI accountability is required until Vyse is reached.

En-route. The helicopter, in the OEI configuration, shall be capable of maintaining 500 feet terrain clearance to a location suitable for an OEI landing. Drift down techniques are acceptable to meet this requirement.

Approach and Landing. At the destination or the single-engine alternate, the helicopter in the OEI configuration, shall be capable of maintaining a zero gradient of climb at 500 feet above the landing level. No OEI accountability is required from a point on the approach path after which Vyse cannot be maintained.

IFR and VFR Night

Take-Off/Take-off Climb. The maximum gross weight for take off is limited to that at which, in the ambient conditions, the helicopter, in the OEI configuration, can maintain a 1% gradient of climb at the initial route segment LSALT. The responsibility for obstacle clearance during climb to LSALT rests with the pilot-in-command. No OEI accountability is required until Vyse is reached.

En-Route. The helicopter, in the OEI configuration, shall be capable of maintaining a 1% gradient of climb at the LSALT required to reach the destination or a suitable OEI landing area.

Approach and Landing. At the destination or the single-engine alternate, the helicopter in the OEI configuration, shall be capable of a 1% gradient of climb at the LSALT or minimum safe altitude as applicable. No OEI accountability is required from a point on the approach path after which Vyse cannot be maintained.

The responsibility for obstacle clearance during OEI missed approach rests with the pilot-in-command.

Performance Standards – Non Passenger Charter, Aerial Work and Private Operations – All Weights

VFR/VFR Night/IFR

For all non-passenger charter, aerial work and private operations, a multi-engine helicopter may be operated without OEI accountability.

Performance Standards – Regular Public Transport Operations – Normal Category Helicopters

VFR

Take-off/Take-off Climb. The maximum gross weight for take-off is limited to that at which, in the ambient conditions, the helicopter can maintain a zero gradient of climb at 1000 feet above the take-off level in the OEI configuration. No OEI accountability is required until Vyse is reached.

En-Route. The helicopter, in the OEI configuration, shall be capable of maintaining 1,000 feet terrain clearance to a location suitable for OEI landing. Drift down techniques are acceptable to meet this requirement.

Approach and Landing. At the destination or the single-engine alternate, the helicopter in the OEI configuration, shall be capable of maintaining a zero gradient of climb 1,000 feet above the landing level. No OEI accountability is required from a point on the approach path after which Vyse cannot be maintained.

VFR Night

NGT VFR flight procedure is not permitted for this class of operation.

IFR

Take-off/Take-off Climb. The maximum gross weight for take-off is limited to that at which, in the ambient conditions, the helicopter in the OEI configuration, can maintain a 1% gradient of climb at the initial route segment LSALT. In addition, the helicopter shall be operated with full OEI accountability. The operator's operations manual shall specify procedures that will permit the helicopter to climb safely to LSALT following a continued take-off after an engine failure.

En-Route. The helicopter, in the OEI configuration, shall be capable of maintaining a 1% gradient of climb at the LSALT required to reach the destination or a suitable OEI landing area.

Approach and Landing. At the destination or the single-engine alternate, the helicopter in the OEI configuration, shall be capable of a 1% gradient of climb at the last route segment LSALT or minimum safe altitude as applicable. During the final approach for landing, the helicopter shall be operated with full OEI accountability. The responsibility for obstacle clearance during OEI missed approach rests with the pilot-in-command.

Performance Standards – Regular Public Transport Operations – Transport Category Helicopters

VFR

Take-off/Take-off Climb. The helicopter is to be operated in compliance with the Category A/Group A procedures specified in the flight manual.

En-Route. The helicopter, in the OEI configuration, shall be capable of maintaining 1000 feet terrain clearance to a location suitable for an OEI landing. Drift down techniques are acceptable to meet this requirement.

Approach and Landing. The helicopter is to be operated in compliance with the Category A/Group A procedures specified in the flight manual.

VFR Night

NGT VFR flight procedure is not permitted for this class of operation.

IFR

Take-off/Take-off Climb. The maximum gross weight for take-off is limited to that at which, in the ambient conditions, the helicopter in the OEI configuration, can maintain a 1% gradient of climb at the initial route segment LSALT. In addition, the helicopter shall be operated in compliance with the Category A/Group A take-off procedures specified in the flight manual. The operator's operations manual shall specify procedures, which will permit the helicopter to climb safely to LSALT following a continued take-off after an engine failure.

En-Route. The helicopter, in the OEI configuration, shall be capable of maintaining a 1% gradient of climb at the LSALT required to reach the destination or a suitable OEI landing area.

Approach and Landing. At the destination or the single-engine alternate, the helicopter, in the OEI configuration, shall be capable of a 1% gradient of climb at the last route segment LSALT or minimum safe altitude as applicable. During the final approach for landing, the helicopter shall be operated in compliance with the Category A/Group A procedures specified in the flight manual. The responsibility for obstacle clearance during OEI missed approach rests with the pilot-in-command.

Signed

Director of Aviation Safety and
Chief Executive Officer

Attachment A — Climb Rate

TABLE A

This table provides a conservative presentation of climb rate required to achieve a 1% climb gradient at a given calibrated airspeed (CAS). For maximum performance, the selected airspeed should correspond to the speed for best rate of climb for a particular aircraft type in the one engine inoperative configuration (Vyse). Where desired CAS does not correspond to a value presented in the table, the correct value should be obtained by interpolation or by reference to the chart at Table B *Climb Rate Gradient* see Attachment B (next page).

Vyse (knots CAS)	**Rate of climb required to achieve 1% gradient (fpm)**
40	47
45	52
50	58
55	64
60	70
65	76
70	82
75	87
80	93
85	99
90	105
95	111
100	117

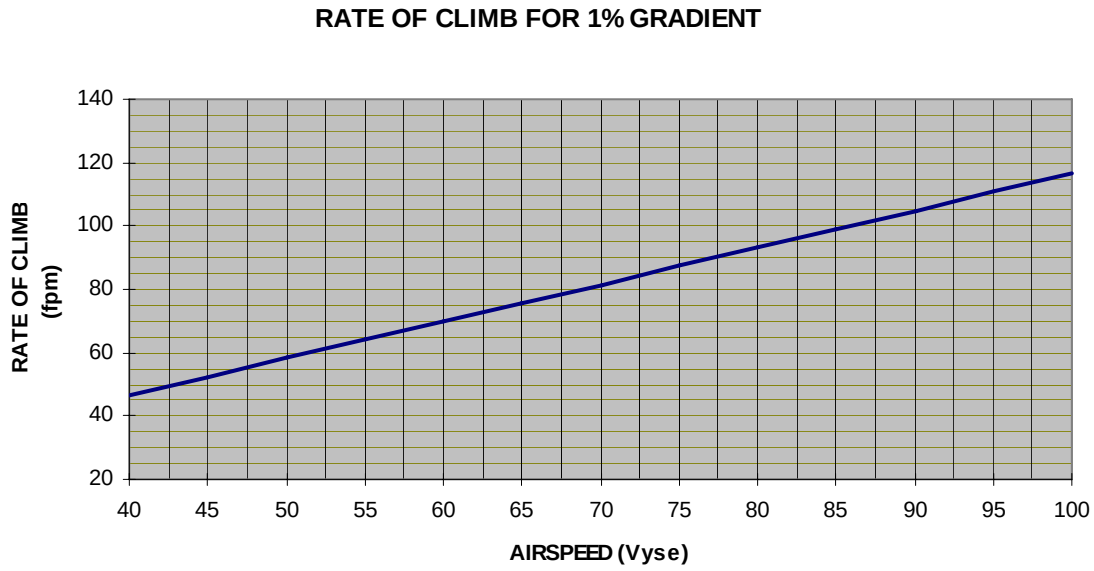
Note: Required rate of climb is 1.15 x Vyse (expressed in knots) derived from formula:

roc = Vyse(fpm/100)x1.15

Attachment B — Climb Rate Gradient

TABLE B

This chart provides a conservative presentation of climb rate required to achieve a one percent climb gradient at a given calibrated airspeed (CAS). For maximum performance, the selected airspeed should correspond to the speed for best rate of climb for a particular aircraft type in the one engine inoperative configuration (Vyse).



Note: This chart is derived from the formula:

roc = Vyse(fpm/100)x1.15