



FLIGHT TEST STANDARDS GUIDE

AEROBATIC FLIGHT RATING AEROPLANE

Issue and continued competency

**Assessment criteria for the guidance of Assessors,
Instructors, Part 141 and Part 149 Organisations**

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Content

Foreword.....	3
Change notice.....	3
Introduction	4
Flight test standard concept.....	4
Use of the flight test guide	5
Flight test guide description	5
Flight test standard description.....	6
Flight test prerequisites.....	6
Aircraft and equipment requirements for flight test	7
Flight assessor responsibility.....	8
Use of distractions during flight tests.....	8
Satisfactory performance.....	9
Unsatisfactory performance.....	10
Recording performance	10
Advice to assessors.....	10
Task: Personal preparation.....	12
Task: Aircraft performance	14
Task: Specific aircraft knowledge	16
Task: Environmental considerations.....	18
Task: Physiological effects and human factors.....	20
Task: Pre-flight briefing.....	22
Task: Demonstration of flying skills	24

Foreword

This Flight Test Standards Guide has been compiled for use by flight instructors, assessors and Part 141 or 149 organisations as an acceptable means of compliance for use in conjunction with the aerobatic flight test syllabuses prescribed in the appropriate CAA Advisory Circular.

Flight Test Standards Guides have been developed by John Parker, the CAA General Aviation Examiner with assistance from Ritchie de Montalk of Massey University.

All initial issue flight tests and biennial demonstrations of competency are to be conducted in accordance with the parameters laid down in this guide.

Any feedback regarding this publication should be directed to info@caa.govt.nz.

Change notice

Minor editorial.

Introduction

This guide contains standards for the flight demonstration of competency for issue and continued competency of the Aerobatic Flight Rating and is to be used by Part 141 or 149 organisations authorised to conduct aerobatic training for the purpose of Aerobatic Flight Rating issue or continued competency demonstrations (Aeroplane).

This flight test guide is based upon the following references;

- CAR Part 61 *Pilot Licences and Ratings*.
- CAR Part 91 *General Operating Flight Rules*.
- AC 61-12 *Pilot Licences and Ratings – Aerobatic Flight rating*.
- NZAIP Planning Manual.

Flight test standard concept

Civil Aviation Rule (CAR) Part 61 and the associated Advisory Circular (AC) specify the areas in which knowledge and skill must be demonstrated by the candidate before a pilot licence or rating is issued.

Flight Test Standards Guides provide the flexibility to permit the CAA to publish flight test standards containing specific TASKS (procedures and manoeuvres) in which pilot competency must be demonstrated.

Adherence to the provisions of the appropriate flight test standard is mandatory for the evaluation of candidates.

Where reference is made to the Planning Manual or AIP this means the Aeronautical Information Publication New Zealand.

Use of the flight test guide

The CAA requires that each flight test be conducted in compliance with the appropriate flight test standard. When using this guide the assessor must evaluate the candidate's knowledge and skill in sufficient depth to determine that the standards of performance listed for all tasks are met.

The assessor is not required to follow the exact order in which the tasks appear. The assessor may change the sequence or combine tasks with similar objectives to save time. However, the objectives of all tasks must be demonstrated and evaluated at some time during the flight test. Assessors will develop a plan of action that includes the order and combination of tasks to be demonstrated by the candidate in a manner that will result in an efficient and valid test. However, where possible, a practical sequence of groundwork, briefing, flying and debriefing should be followed.

Assessors will place special emphasis on areas that are most critical to flight safety. Among these are pilot, aircraft and engine limitations, height control, energy management, sound judgement in decision-making, threat and error management, spatial orientation and collision avoidance. Although these areas may not be shown under each task, they are essential to flight safety and will receive careful evaluation throughout the flight test. If these areas are shown in the objective, additional emphasis will be placed on them.

Flight test guide description

Flight Test Standards Guides are distributed free of charge and are amended by replacement when a change to Part 61 deems it necessary.

This guide has been designed to minimise the degree of subjectivity in the demonstration of competency although the assessor will still have to exercise judgement.

The assessment criteria for the Aerobatic Flight Rating, defines 'competent', 'not yet competent' and 'ideal' performances.

The rating scale 0 – 100 with competence achieved at 70+, and an above average performance achieved at 85+, may also be used if preferred.

Flight test standard description

TASKS are procedures and manoeuvres appropriate to the demonstration required for the Aerobatic Rating (Aeroplane) issue and continued competency.

The OBJECTIVE that appears below the task relates that task to the regulatory requirement and lists the important elements that must be satisfactorily performed to demonstrate competency in that task.

The minimum acceptable standard of performance for a task is described in the column stating COMPETENT.

The IDEAL performance of a task is described in the right column. In many cases the perfect performance is not achievable but is simply stated as an ideal against which performance can be measured.

Unacceptable performance of a task is described in the NOT YET COMPETENT column.

The ACTION assists the assessor in ensuring that the task objective is met, and in some instances, alerts the assessor to areas upon which emphasis should be placed.

The conditions under which the task is to be performed are expanded on under the 'satisfactory/unsatisfactory performance' headings, which follow.

Flight test prerequisites

A candidate for an Aerobatic Rating is required by Rule Part 61.21 as a prerequisite to;

- (a) Have obtained the requisite flight training and experience, and
- (b) Have proof of their identity, and
- (c) Hold an aircraft type rating for the type.

In addition, Civil Aviation Rule Part 61.551 requires the candidate to;

- (a) Have satisfactorily completed an aerobatic ground and flight training course conducted under the authority of a Part 141 or a 149 organisation.

Aircraft and equipment requirements for flight test

The candidate is required, under CAR Part 61.25, to provide aircraft appropriate for the flight test. The aircraft must be equipped for, and its operating limitations must not prohibit, the pilot operations required during the test. Required equipment will include;

- (a) Fully functioning dual flight controls, and
- (b) Those instruments essential to the manoeuvres planned to be demonstrated during the flight visible to both pilots without excessive parallax error, and
- (c) At least four-point harness for both occupants, and
- (d) Intercommunication equipment acceptable to the assessor.

The candidate is required to provide adequate and private facilities for briefing prior to and after the flight test.

Whether an aircraft can be used for a flight test or not is a function of the aircraft's flight manual and its Certificate of Airworthiness. The following information is provided for instructors and assessors.

Aeroplane C of A's acceptable for aerobatic issue or renewal demonstrations:

1. Standard category
2. Special category – LSA
3. Special category – Amateur built (where the candidate is the owner)
4. Special category – Exhibition (where the operator is approved)
5. Special category – Limited (where the operator is approved).

Flight assessor responsibility

The assessor who conducts the issue or biennial competency flight test is responsible for determining that the candidate meets the standards outlined in the objective of each TASK.

The assessor shall meet this responsibility by taking an ACTION that is appropriate for each task.

For each task that involves "knowledge only" elements, the assessor will orally question the candidate on those elements.

For each task that involves both "knowledge and skill" elements, the assessor will orally question the candidate on the knowledge elements and ask the candidate to perform the skill elements.

For aerobatic rating biennial demonstrations, the assessor may designate the candidate as pilot- in-command provided the candidate's aerobatic rating is still current.

Under the current Rule, only the pilot-in-command may log the flight time.

Use of distractions during flight tests

Artificial distractions are not appropriate to the aerobatic rating issue or continued competency demonstration.

Satisfactory performance

The ability of a candidate to perform the required task for (this rating) is based on a demonstration of competence in;

- (a) Executing tasks within the aircraft's performance capabilities and limitations as laid down in the aircraft's flight manual, including use of the aircraft's systems.
- (b) Executing emergency procedures and manoeuvres, appropriate to the aircraft and in accordance with recommended procedures.
- (c) Piloting the aircraft with smoothness and accuracy, in accordance with the limitations detailed in the aerobatic flight test guide.
- (d) Executing all exercises involving balanced flight with no more than 1/4 ball sustained deflection in slip or skid.
- (e) Judgement/decision making and situational awareness.
- (f) Applying aeronautical knowledge (principles of flight) to in-flight situations.
- (g) Showing complete control of the aircraft, with the successful outcome of a task never in any doubt.

Unsatisfactory performance

If, in the judgement of the assessor, the candidate does not demonstrate competence in any task, the task demonstration is failed for the purpose of the rating issue or renewal.

The assessor or candidate may discontinue the test at any time after the failure of a task makes the candidate ineligible to pass the competency demonstration. The demonstration will only be continued with the consent of the candidate.

Any action or lack of action by the candidate, which requires corrective intervention by the assessor to maintain safe flight, will be disqualifying.

Unsatisfactory performance in any test item will result in the candidate being advised of the failure aspects and the additional training believed necessary before a further ground and flight demonstration may be undertaken.

Recording performance

During the demonstration, if performance is unsatisfactory, the assessor must record this on the flight test report against the specific task and in accordance with the Part 141 or 149 organisations approved procedures.

CAA 24061/25 is used to record all Aerobatic Flight Rating issue and renewal assessments.

Advice to assessors

A successful demonstration of competency above 3000 feet only, should be endorsed in the logbook and on report form CAA24061/25 as “restricted to aerobatics above 3000 feet above the surface”.

ASSESSMENT CRITERIA

Task: Personal preparation

Objective:

To determine that the candidate demonstrates a safe attitude to aerobatic flight by;

- (a) Arriving in a timely manner to ensure adequate preparation for the flight; suitably attired (no loose articles) and fit for flying.
- (b) Presenting appropriate proof of identity, ground and flight aerobatic training records and an up to date, summarised and certified pilot's logbook, a current PPL, CPL or ATPL and a valid type rating for the aeroplane to be used.
- (c) Demonstrating knowledge of air show incidents and an understanding of their common causes.
- (d) Demonstrating knowledge of the privileges, currency requirements and limitations of the Aerobatic Flight Rating.

Action:

The assessor will;

- (a) Observe the candidate's preparation for flight (including the briefing of any passenger re loose articles), attire, and as far as practicable, determine that the candidate is fit to fly.
- (b) Determine that the candidate is the holder of the licence and training records presented.
- (c) By examination of the candidate's logbook and training records, determine that appropriate training has been completed.
- (d) Ensure that the candidate holds a current pilot's licence (Aeroplane) endorsed with the appropriate aircraft type rating.
- (e) Place emphasis on the candidate's knowledge of the privileges, currency and limitations of the Aerobatic Flight Rating.

Personal Preparation

Rating **70** **85** **100**

Not yet competent **COMPETENT** **Ideal**

(1) Is disorganised	(1) Prepares for flight in a methodical unhurried way	
(2) Drops a personal item in the cockpit (Critical Element)	(2) Dressed securely and ensures passenger security	(2) Exudes professionalism
(3) Fit but nervous	(3) Fit, enthusiastic and confident	(3) Fit, enthusiastic and exudes confidence
(4) The candidate's identity cannot be confirmed	(4) The candidate is known to the assessor	(4) The candidate provides proof of identity in accordance with AC 61.17
	(5) Appropriate aerobatic training has been completed and correctly recorded	(5) All appropriate documentation is presented and correct
	(6) The candidate holds a current pilot licence endorsed with the appropriate aeroplane type rating	
(7) The candidate is unaware of the privileges, currency and/or limitations of an Aerobatic Flight Rating	(7) The candidate exhibits adequate knowledge of the privileges, currency and limitations of an Aerobatic Flight Rating	(7) The candidate is fully aware of the privileges, currency and limitations of an Aerobatic Flight Rating

ASSESSMENT CRITERIA

Task: Aircraft performance

Objective:

To determine that the candidate understands;

- (a) The relationship between TAS and lift, drag, turn rate and turn radius.
- (b) The theory of load factor, its effect on stalling and the accelerated stall.
- (c) The effect of lift and drag devices and the control of induced drag.
- (d) The effect of density altitude on TAS, radius of turn, pull out and powerplant performance.
- (e) The effect of centre of gravity position on the standard and utility categories and spin recovery.

Action:

The assessor will;

- (a) Require the candidate to explain the relationship between TAS and lift, drag, turn rate and turn radius.
- (b) Require the candidate to explain load factor, its effect on stalling and the accelerated stall.
- (c) Require the candidate to explain the effect of lift and drag devices and how the pilot can control induced drag.
- (d) Require the candidate to describe the effect of density altitude on TAS, radius of turn, pull out and powerplant performance.
- (e) Require the candidate to plot the aircraft's centre of gravity and explain how this affects the aircraft's category and spin recovery.
- (f) Determine that the candidate's explanations demonstrate a satisfactory level of understanding.

Aircraft Performance

Rating **70** **85** **100**
Not yet competent **COMPETENT** **Ideal**

(1) Cannot explain the relationship between TAS and lift, drag, turn rate and/or turn radius	(1) Satisfactorily explains the relationship between TAS and lift, drag, turn rate and turn radius	(1) Comprehensively explains the relationship between TAS and lift, drag, turn rate and turn radius
(2) Is unaware or incorrect as to the effect of load factor on stall speed	(2) Satisfactorily explains the relationship between load factor and the stall	(2) Comprehensively explains the relationship between load factor and the stall
(3) Is unaware of the pilot's ability to alter lift and drag and/or control induced drag	(3) Satisfactorily explains the effect of lift and drag devices and the control of induced drag	(3) Comprehensively explains the effect of lift and drag devices and the control of induced drag
(4) Is unaware of the effect of density altitude on TAS, radius of turn, pull out and/or powerplant performance	(4) Satisfactorily describes the effect of density altitude on TAS, radius of turn, pull out and/or powerplant performance	(4) Comprehensively and accurately describes the effect of density altitude on TAS, radius of turn, pull out and/or powerplant performance
(5) Cannot satisfactorily calculate the aircraft's C of G and/or understand its affects on the aircraft category and/or spin recovery	(5) Satisfactorily calculates the aircraft's C of G and understands its affect on the aircraft category and spin recovery	(5) Accurately calculates and plots the aircraft's C of G and demonstrates a thorough understanding of how it affects the aircraft's category, spin characteristics and spin recovery

ASSESSMENT CRITERIA

Task: Specific aircraft knowledge

Objective:

To determine that the candidate exhibits adequate knowledge of their aircraft for aerobatic flight by knowing;

- (a) Wing loading.
- (b) Load factor (“g”) limits.
- (c) Maximum operating speeds.
- (d) Power to weight ratio.
- (e) Impact of modifications existing on the aircraft.

Action:

The assessor will;

- (a) Question the candidate about the specific aircraft’s limitations and performance capabilities, and determine that the candidate’s performance meets the objective.
- (b) Place emphasis on the candidate’s awareness of aircraft limitations.

ASSESSMENT CRITERIA

Task: Environmental considerations

Objective:

To determine that the candidate considers;

- (a) The effect of wind in relation to the display and crowd line.
- (b) The possibility of wind shear and turbulence effects.
- (c) Ceiling, visibility and visual reference requirements.
- (d) Terrain, obstructions and the effects of over water displays.
- (e) The effect of sunlight and lack of adequate light versus depth perception.

Action:

The assessor will;

- (a) Determine that the candidate has considered all relevant environmental factors relating to the demonstration.
- (b) Propose a hypothetical demonstration (at assessor discretion) to ensure the candidate is aware of all environmental factors.
- (c) Place emphasis on the candidate's ability to make a sound go/no go decision.

Environmental Considerations

Rating

70

85

100

Not yet competent

COMPETENT

Ideal

(1) Does not appreciate the effect of wind on the sequence in relation to the display line and/or crowd line for the proposed or hypothetical flight	(1) Considers the effect of wind on the sequence in relation to the display line and/or crowd line and compensates accordingly	(1) Accurately predicts the effect of wind on the sequence in relation to the display line and/or crowd line and compensates appropriately
(2) Does not consider the possibility or the effect of wind shear and/or turbulence on the proposed or hypothetical flight	(2) Considers the possibility and the effect of wind shear and turbulence on the display and compensates accordingly	(2) Accurately predicts the effect of wind shear and turbulence on the display and compensates appropriately
(3) Is willing to continue with (in the assessors opinion) insufficient cloud base, visual reference or visibility for the proposed or hypothetical flight	(3) Operates in conditions of suitable cloud base, visual references and visibility	
(4) Is unaware of the effects of terrain and/or obstructions and/or expanses of water within the display area on the proposed or hypothetical flight	(4) Demonstrates an appropriate level of knowledge of the effects of terrain, obstructions and over water displays	(4) Demonstrates a thorough understanding of the effects of terrain, obstructions and over water displays
(5) Does not demonstrate an appreciation of the effect of sunlight and/or lack of adequate light versus depth perception on the proposed or hypothetical flight	(5) Demonstrates sufficient understanding of the effect of sunlight and lack of adequate light versus depth perception on the proposed or hypothetical flight	(5) Demonstrates a thorough understanding of the effect of sunlight and lack of adequate light versus depth perception on the proposed or hypothetical flight
(6) Does not make a go/no go decision for the proposed or hypothetical flight	(6) Makes an appropriate go/no go decision (Critical Element)	(6) Makes a sound and appropriate go/no go decision

ASSESSMENT CRITERIA

Task: Physiological effects and human factors

Objective:

To determine that the candidate understands;

- (a) The physiological affects on human performance of high and low temperatures, hydration , diet and stress.
- (b) The effects of physical condition on “g” tolerance.
- (c) The symptoms of GLOC and the importance of breathing techniques and posture.

Action:

The assessor will;

- (a) Question the candidate on the affects of high and low temperatures, hydration, diet and stress to determine that the candidate does understand how these affect performance.
- (b) Question the candidate on the effects of physical condition on “g” tolerance and determine that the candidate does understand these effects.
- (c) Question the candidate on the symptoms of GLOC and the importance of breathing techniques and posture to determine that the candidate does understand.

Physiological Effects and Human Factors

Rating

70

85

100

Not yet competent

COMPETENT

Ideal

<p>(1) The candidate is unaware of the effects of high/low temperatures, hydration, diet and/or stress on performance</p>	<p>(1) The candidate demonstrates a satisfactory understanding of the effects of high/low temperatures, hydration, diet and stress on performance</p>	<p>(1) The candidate demonstrates a comprehensive understanding of the effects of high/low temperatures, hydration, diet and stress on performance</p>
<p>(2) The candidate does not understand the effect of physical condition on “g” tolerance</p>	<p>(2) The candidate demonstrates a satisfactory understanding of the effect of physical condition on “g” tolerance</p>	<p>(2) The candidate demonstrates a thorough understanding of the effect of physical condition on “g” tolerance</p>
<p>(3) The candidate does not know the symptoms of GLOC and/or the importance of breathing techniques and posture on “g” tolerance</p>	<p>(3) The candidate demonstrates a satisfactory understanding of the symptoms of GLOC and the importance of breathing techniques and posture on “g” tolerance</p>	<p>(3) The candidate demonstrates a thorough understanding of GLOC and the importance of breathing techniques and posture on “g” tolerance</p>

ASSESSMENT CRITERIA

Task: Pre-flight briefing

Objective:

To determine that the candidate has an appropriate sequence to be flown by:

- (a) Briefing the assessor on the sequence to be flown; including,
- (b) Actions in the event of engine failure, and
- (c) Actions in the event of loss of control and/or orientation, and
- (d) Actions in the event of communications failure (tandem seating and ATS as applicable), and
- (e) Bail-out and parachute considerations (if applicable).

Action:

The assessor will;

- (a) Determine that the candidate's briefing comprehensively describes the sequence to be flown and the considerations.
- (b) Consider the logic of the proposed sequence and determine (through questioning as appropriate) the candidate's energy management plan and actions in the event of insufficient energy for a manoeuvre.
- (c) Question the candidate on bail out and parachute considerations as applicable

Pre-Flight Briefing

Rating **70** **85** **100**

Not yet competent

COMPETENT

Ideal

(1) The candidate omits essential points	(1) The candidate provides a clear briefing of the sequence to be flown and the procedures to be followed in the event of an emergency	(1) The candidate provides a comprehensive briefing of the sequence to be flown and the procedures to be followed in the event of an emergency
(2) The proposed sequence lacks logic in energy management	(2) The proposed sequence is logical in energy management	(2) The proposed sequence maximises energy management
(3) The candidate has no action plan in the event of insufficient energy for a manoeuvre	(3) The candidate has a suitable action plan in the event of insufficient energy for a manoeuvre	
(4) The candidate's bail out and parachute procedures and/or technique's (if applicable) are inappropriate	(4) The candidate's bail out and parachute procedures (if applicable) are appropriate	

ASSESSMENT CRITERIA

Task: Demonstration of flying skills

Objective:

To determine that the candidate is competent in aerobatics by;

- (a) Ensuring the aircraft is configured for aerobatics, carrying out the pre-flight inspection (with emphasis on loose articles) and arranging approvals to use the aerobatic area (as applicable).
- (b) Carrying out pre-aerobatic checks.
- (c) Demonstrating, above 3000 feet above the surface, recovery from unusual attitudes and the spin.
- (d) Demonstrating above and/or below 3000 feet (as applicable) but not below 1500 feet above the surface, the briefed aerobatic sequence which must include the three basic aerobatic manoeuvres of loop, roll and stall turn.
- (e) Demonstrating airmanship and situational awareness appropriate to the aerobatic flight rating.

Action:

The assessor will;

- (a) Observe the candidate's preparations for flight and determine that it meets the objective.
- (b) Observe the candidate's pre-aerobatic checks for appropriateness.
- (c) Take control and place the aircraft in a range of unusual attitudes (at least one nose high, one nose low and a spin) and require the candidate to recover to straight and level 3000 feet above ground.
- (d) Observe the candidate's demonstration of the briefed aerobatic sequence above and/or below 3000 feet (as applicable) but not below 1500 feet above the surface.
- (e) Observe the candidate's airmanship and situational awareness and determine that the candidate's performance meets the objective.

Demonstration of Flying Skills

Rating

70

85

100

Not yet competent

COMPETENT

Ideal

<p>(1) The candidate does not ensure the aircraft is configured for aerobatic flight and/or free of loose articles (Critical Element)</p>	<p>(1) The candidate completes the aeroplane pre-flight inspection and ensures the aircraft is configured for aerobatic flight</p>	<p>(1) The candidate completes a thorough aeroplane pre-flight inspection with emphasis on loose articles and ensures the aircraft is configured for aerobatic flight</p>
<p>(2) The candidate does not carry out pre-aerobatic checks</p>	<p>(2) The candidate carries out appropriate pre-aerobatic checks</p>	<p>(2) The candidate carries out appropriate pre-aerobatic checks including fuel asymmetry and/or configuration imbalances and energy considerations prior to commencement of the sequence</p>
<p>(3) The candidate does not recover from unusual attitudes or spinning at or above 3000 feet above the surface</p>	<p>(3) The candidate recovers from unusual attitudes and spinning at or above 3000 feet above the surface</p>	
<p>(4) The candidate descends below 3000 feet above the surface or crosses the display line during the aerobatic sequence (Critical Elements)</p>	<p>(4) The candidate completes the briefed aerobatic sequence without descending below 3000 feet above the surface or crossing the display line</p>	<p>(4) The candidate completes the briefed aerobatic sequence with smoothness and precision, never descending below 3000 feet above the surface nor crossing the display line</p>
<p>(5) The candidate descends below 1500 feet above the surface or crosses the display line during the aerobatic sequence (Critical Elements)</p>	<p>(5) If applicable, the candidate completes the briefed aerobatic sequence without descending below 1500 feet above the surface or crossing the display line</p>	<p>(5) The candidate completes the briefed aerobatic sequence with smoothness and precision, never descending below 1500 feet above the surface nor crossing the display line</p>