

Test Pilot Approvals

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General

Civil Aviation Authority Advisory Circulars contain information about standards, practices, and procedures that the Director has found to be an **Acceptable Means of Compliance (AMC)** with the associated rule.

An AMC 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 (GM)** to facilitate compliance with the rule requirements. Guidance material must not be regarded as an acceptable means of compliance.

Purpose

This Advisory Circular provides material intended to assist in understanding the requirements for approval as a test pilot for experimental flying or testing of a prototype aircraft.

Related Rules

This Advisory Circular relates specifically to Civil Aviation Rule Part 19-*Transition Rules* Subpart I, and Part 21-*Certification of Products and Parts* Subpart B.

Change Notice

Initial issue.

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Introduction

This Advisory Circular (AC) describes procedures under which pilots may be approved as a test pilot under rule 19.405 to carry out prototype testing and experimental flying. It defines various categories of experimental flying and lists the qualifications and experience that pilots are expected to have for approval as a test pilot for each category of experimental flying.

If a person wishes to act as a test pilot, the person should apply to the Director in writing for approval. Application form (CAA form 24019/04) for a person seeking test pilot approval is available on the CAA website or from the CAA Aircraft Certification Unit.

Background

Historically, pilots have been approved by the Director to undertake prototype testing or experimental flying in New Zealand on an 'ad-hoc' basis, after consideration of their qualifications and experience. While this process has previously been acceptable, the significant increase in experimental flying activity in relation to prototype, amateur built, non-certificated and warbird aircraft in recent years dictates formalisation of the process to ensure sufficient rigour and transparency. The CAA has an obligation to ensure that prototype testing and experimental flying is performed in accordance with internationally accepted standards and procedures, and to ensure that pilots performing prototype testing or experimental flying are appropriately qualified and experienced.

Terminology

For the purposes of this AC, the following terms are described:

Experimental Flying

Experimental flying (commonly known as flight test, or test flying in relation to the airworthiness of an aircraft) is an activity that is performed when:

- (a) an aircraft is flown in a configuration such that the systems operating, flight handling or performance characteristics are not known and must be determined, such as a prototype aircraft or an existing aircraft with a modification to a new configuration; or
- (b) an aircraft is flown outside the existing approved operating envelope as defined on the type certificate or in the flight manual.

Experimental flying is performed to determine the adequacy, suitability or functionality of an aircraft, aircraft systems, handling or performance. It is normally performed in accordance with a documented test plan, which has been developed, reviewed and approved by appropriately qualified professionals, usually from a Part 146 certificated design organisation. It may also be performed to determine compliance with relevant certification requirements, such as the FAA Federal Aviation Regulations (FARs), EASA Certification Specifications (CS's) or the New Zealand Civil Aviation Rules (CARs).

Prototype Testing

Prototype testing refers to the flight testing of a new aircraft type. This may be a completely new type or the re-configuration of an existing type. This applies to an aircraft type intended for type certification under a type certificate or a supplemental type certificate. It is considered a prototype if it has a new model designation, or if the changes require a substantial re-assessment against the applicable certification requirements. It does not apply to amateur built aircraft or other special category aircraft such as ex-military aircraft.

CAA Test Pilot

The CAA test pilot is employed within the Aircraft Certification Unit of the CAA to provide specific flight test expertise to the CAA and the New Zealand aviation industry. The CAA test pilot

conducts audits of industry experimental flying activity, and assesses candidates for approval as test pilots where necessary.

Categories of Experimental Flying

The scope and range of experimental flying activities is so wide that it would be inappropriate to classify it as a single activity. This would otherwise mandate a very high level of pilot skill and experience, which would not necessarily be required for more minor experimental flying activities. To enable the proper level of assessment of test pilot approvals, experimental flying is divided into several categories of complexity (and corresponding pilot experience levels). These categories are detailed below:

Category 1 Experimental Flying

Category 1 Experimental Flying encompasses the most complex types of programmes such as a prototype aircraft intended for type certification. All category 1 experimental flying will be performed in accordance with an approved test plan, prepared by a Part 146 certificated design organisation. Pilots seeking to perform category 1 experimental flying will require a high level of flying experience and will be required to undergo a formal interview and check flight with the CAA test pilot as part of the approval process.

It is expected that a person carrying out category 1 experimental flying would meet the following requirements:

- (a) commercial pilot licence, in the case of FAR 23 aircraft or FAR 27 helicopters:
- (b) airline transport pilot licence for FAR 25 aircraft or FAR 29 helicopters:
- (c) an instrument rating and experience in the category of aircraft for which the candidate is seeking approval to conduct test flying:
- (d) an acrobatic rating if appropriate:
- (e) a class 1 medical certificate:
- (f) a minimum of 2000 flight hours (1000 in the case of helicopters), with at least 1000 hours as pilot-in-command (500 in the case of helicopters):
- (g) previous experimental flying experience:
- (h) familiarity with certification requirements:
- (i) recent relevant experience of at least 100 hours in the previous 12 months.

Desirable experience for Category 1 experimental flying includes an instructor rating.

Category 2 Experimental Flying

Category 2 experimental flying covers existing aircraft which have undergone a major modification that may have impacted the flying qualities, performance or certification basis of the aircraft. Examples of category 2 experimental flying include an expansion of the existing flight envelope or weight and centre of gravity range, or a significant change in power plant type. Candidates for approval under category 2 will normally require an interview and a check flight with the CAA test pilot.

It is expected that a person carrying out category 2 experimental flying would meet the same requirements for category 1 experimental flying, except the previous experimental flying experience and requirements of paragraphs (g) and (h) under category 1 may be reduced.

Category 3 Experimental Flying

Category 3 experimental flying covers evaluation flying which is conducted in accordance with a CAA approved test plan for the purposes of issuing a special category-experimental airworthiness certificate for an aircraft in accordance with rule 21.193(c)(1).

Modifications to certificated aircraft expected to have minor or insignificant effects on handling and performance but requiring airborne verification would be included under this category.

Evaluation flying of amateur-built aircraft is also classified as category 3 experimental flying. However these aircraft and their test pilots are handled separately by the Sport and Recreation Section of the CAA General Aviation Group. See Advisory Circular AC21-4 for advisory material on approval as a test pilot for amateur-built aircraft.

It is expected that a person carrying out category 3 experimental flying would meet the following requirements:

- (a) commercial pilot licence:
- (b) applicable rating for the type of aircraft and testing to be performed (which may include, but not limited to; instrument rating; tailwheel rating; acrobatic rating; float-plane rating; gas turbine rating; etc.):
- (c) a class 1 medical certificate:
- (d) a minimum of 500 flight hours pilot-in-command:
- (e) recent relevant experience of at least 100 hours in the previous 12 months.

Production Flight Test

Production or acceptance test flying of newly-manufactured certificated aircraft types is not experimental flying and therefore a test pilot approval is not required. Production flight testing is carried out in accordance with documented procedures which are normally detailed in the manufacturers Part 148 exposition and not a CAA approved test plan. The pilot will require a licence and rating appropriate to the aircraft type. This activity is covered under Part 148 and does not need approval under rule 19.405.

Post-Maintenance Flight Test

Post maintenance flight test (also referred to as 'operational flight check' in rule 91.613) is not experimental flying and therefore a test pilot approval is not required. A pilot undertaking such flying must be appropriately licensed and rated for the subject aircraft. The procedures for a post-maintenance flight test are normally specified by the aircraft manufacturer or by company procedures in the case of a maintenance organisation or an air operator.

Approval Process

Approval as a test pilot follows a specific process, with the extent and complexity depending on the category of experimental flying proposed. The normal sequence of events is as follows:

Submission of Application

CAA form 24019/04 – *Application for Test Pilot Approval* must be completed and submitted to the Director. Form 24019/04 can be obtained from the CAA web site:

<http://www.caa.govt.nz/Forms/24019-04.pdf> or from the CAA Aircraft Certification Unit. Every applicant is requested to describe the nature of the proposed experimental flying as completely as possible. Supporting documentation such as resumes, test plans, engineering documents or proposals should be attached with the application.

If the application is in respect of an amateur-built aircraft, CAA form 24019/03 should be completed. Refer to Advisory Circular AC 21-4.

Review of Application

The process involves:

- (a) review of the proposed experimental flying to ensure the category classification is appropriate for the activity being applied for:
- (b) review of the applicant's qualifications and experience against the minimum requirements specified for the category of experimental flying applied for:
- (c) notification to applicants who meet the minimum requirements specified for category 1 or 2 experimental flying as appropriate for the experimental flying to be undertaken, and arrangements made for an interview with the applicant. The applicant will also usually need to undergo a check flight:
- (d) notification to applicants who meet the minimum requirements specified for a category 3 experimental flying as appropriate for the experimental flying to be undertaken. An interview may not be necessary unless the proposed flying involves complex procedures.
- (e) notification to applicants who do not meet the requirements for any of the 3 categories of experimental flying, with details of those areas where the applicant is deficient.

Interview

Every applicant for a test pilot approval for category 1 or 2 experimental flying will be interviewed by the CAA test pilot and where appropriate other CAA personnel drawn from relevant disciplines. The venue and method of interview will be discussed between the applicant and the CAA.

The applicant may be asked to outline a proposed experimental flying programme, and describe the anticipated procedures and techniques. A range of questions relevant to the activity may be asked. The applicant's knowledge of the applicable certification requirements and the procedures covering experimental flying will be examined, as will their experience and qualifications.

Based on the interview, the CAA test pilot can assess whether or not the applicant is suitable for the proposed activity. If the applicant is unsuccessful at the interview stage the applicant will be informed accordingly.

Check Flight

Following successful completion of the interview stage, an applicant for a test pilot approval for category 1 or 2 experimental flying will undergo a check flight with the CAA test pilot, in order to ascertain the applicant's technical and flying proficiency for the proposed experimental flying.

It is the responsibility of the applicant to provide the aircraft that is to be used for the check flight, and the applicant will be the pilot-in-command throughout the check flight.

The check flight will last approximately 1 hour, in an aircraft type that the applicant is rated on and familiar with. The type of aircraft selected will be similar to that planned for the experimental flying for which the applicant is seeking approval, and the applicant will be asked to demonstrate skills or techniques that will be required during that experimental flying. An assessment of the applicant's airmanship, flying proficiency and theoretical knowledge of experimental flying will be made. The applicant may be asked to prepare a test plan prior to the check flight and a written flight test report after the flight.

An applicant for a test pilot approval for category 1 or 2 experimental flying who is a graduate of a recognised test pilot school may not be required to undertake the check flight, depending on the applicant's experience.

Approval

Once the process detailed above has been completed satisfactorily, the Director may approve the applicant as a test pilot for the specific activity applied for. This approval may include limitations

and duration as is deemed appropriate. If an application is unsuccessful, the applicant will be informed of the decision in writing with the reasons stated.

Once approved as a test pilot under rule 19.405, the pilot may perform that experimental flying for which the pilot is approved, subject to CAA oversight and audit as necessary.

General Notes

An applicant for a test pilot approval for category 1 experimental flying is expected to be a very experienced test pilot who is employed as a test pilot by a Part 146 certificated design organisation or a Part 148 certificated aircraft manufacturing organisation, or as a specialist consultant.

A test pilot approval for category 1 or 2 experimental flying may be issued for a class of aircraft to suitably qualified and experienced test pilots, rather than for a single specific activity. The approval would normally be issued for a maximum period of 2 years. Renewal of the approval would initially involve a review of activities undertaken during the preceding period, and then as much of the normal issue process as is appropriate based on the review.

A test pilot approval for category 3 experimental flying would normally be limited to a specific activity or programme and would expire when that activity had been completed, but with a maximum validity period of 2 years.

The Role and Responsibility of an Approved Test Pilot

When the Director approves a pilot to act as a test pilot, the pilot should recognise the responsibility that accompanies this position.

A test pilot should meticulously and faithfully record the *actual* data observed during a flight. The techniques used to obtain such data must be standardised. For this reason, the techniques and procedures are normally specified in the test plan, and are obtained from documents such as FAA AC 23-8B, *Flight Test Guide for the Certification of Part 23 Airplanes*.

Flight test data is to be properly documented and the results forwarded for analysis and review to the organisation responsible for preparing the compliance data. The data that is recorded by a test pilot forms the basis on which engineering, safety and operational decisions are made.

A test pilot should be impartial, and not be affected by 'commercial pressure' or an expedient to achieve a 'required result'. If an aircraft fails to meet the requirements of a particular test the reasons for the failure must be examined and addressed.

Audit of Experimental Flying

The grant of a test pilot approval does not allow the applicant to perform prototype testing or experimental flying, nor modify an aircraft, without appropriate CAA involvement and compliance with the applicable provisions of CAR Parts 21 and 91. The CAA will audit all experimental flying activities, which have certification implications, to ensure the accuracy and the quality of the reported data. This audit may include, but not be limited to, the following:

- (a) review of test plans and procedures:
- (b) CAA witness of tests:
- (c) review of test reports and data:
- (d) an audit of the experimental flying of the aircraft by the CAA test pilot.

The size and scope of these audits will be determined by the quality, accuracy and reliability of the reports submitted to the CAA for review. The experimental flying audit may comprise a re-test of a small number of selected points (normally a minimum of 10%), through to a complete re-test of the entire programme. A complete re-test is normally only required in cases where the submitted data is either incomplete, inaccurate, or is proven to be false or misleading.

It is therefore important to ensure that the experimental flying is accurate, complete, is reported accurately and meets the requirements of the test plan.. It must be recognised that a pilot of limited experience or qualification is unlikely to produce the type and quality of results necessary to achieve certification to the recognised standards.

The CAA has developed this AC to provide guidance on the assessment of a person who wishes to act as a test pilot to carry out prototype testing or experimental flying.

Correspondence and forms

Correspondence relating to prototype testing or experimental flying and test pilot approval can be sent to the CAA at the following address marked for the attention of the Aircraft Certification Unit. The forms referred to in this Advisory Circular can be obtained from either the Aircraft Certification Unit or from the CAA website:

Civil Aviation Authority
PO Box 31441
Lower Hutt 6315
Ph: (04) 560 9567
Fax: (04) 569 2024

or the CAA website: www.caa.govt.nz

Charges

Applications for test pilot approval will be assessed in accordance with the Civil Aviation Charges Regulations (No 2) 1991.