

Apprenticeship reform: End-testing

The Private Pilot Licence

Introduction

The Private Pilot Licence (PPL) is the internationally-recognised entry qualification for all flight crew in general aviation. It acts as a standalone entitlement to fly rated aircraft solo, but is also the first step on the progression ladder to airline transport and commercial transport licences. It has been assessed as being equivalent to an NVQ Level 3 (2003) with an 'instrument rating' addition taking it to Level 4.

Why is the PPL a case study for Apprenticeship reform?

A pilot **must** be vocationally competent to a high level, have an extensive range of knowledge and demonstrate a set of identifiable behaviours. They operate within a heavily regulated and safety-driven environment. Their training (both content and assessment outcomes) is continually refined under international scrutiny to make it suitable for all 165 countries that are signed up to the Joint Aviation Requirement (JAR) and could be said to illustrate the highest level of evolution in a skill-based competence scaffold.

Assessment includes written examinations, verbal interviews, practical assessments and a variable end test. The end test is the subject of this case study as it is an exemplar of a process that is valid, rigorous and achievable in all locations where testing may take place.

The key elements are:

- an integrated end testing regime that draws from a range of assessment tools;
- assessment components that have been extensively field-tested with a well-developed evaluative framework;
- assessment within a high-risk environment, with multiple customer and user input points.

The PPL end test

The PPL entitles the holder to:

- fly solo through controlled and uncontrolled airspace and interact with air traffic control (ATC) and other aircraft;
- make decisions on the grounds of safety and with regard to a variety of conditions, including air-worthiness, weather, passenger needs and the instructions of controlling authorities.

As a result, the end test must fulfil three elements of international aviation law through a mandatory requirement for:

- documented, written testing;
- skills-competence assessment;
- a judgment of fitness to fulfil the duties of a registered PPL holder.

Typically, the end test follows a minimum of 50 hours of instruction, observation and skills assessments either observed or remotely conducted (solo flying) and candidates undertaking the end test will have been judged as having a greater than 80% chance of success at the first attempt (not unlike a driving test, where the instructor judges the learner to be more likely than not of passing the test).

A certified PPL holder must:

“Be competent in the general handling of any aircraft to which they hold an appropriate rating, be well-versed in the appropriate requirements in law for the airspace into which they intend to fly and be able to make informed, evidence-based decisions on all aspects of safety, weather, health and well-being of themselves and passengers.”

The Joint Aviation Requirement 2012

The end testing regime

To satisfy the requirement for a holistic synoptic assessment as well as a skills-competence evidence base, the testing regime has been iteratively refined so that assessment follows a relatively uniform standard. In all but four countries/jurisdictions, the end test is composed of the following elements:

- Approximately 12-15 written examinations of 90 minutes duration taken over a period of time when the candidate is judged ready and at the candidate's discretion (normally between 12 and 36 months; for the UK, the average time is 14 months). Exams are a mix of multiple choice, keyword entry and scenario/problem solving.

Progress to the next element is dependent on a successful outcome.

- A minimum of 2 hours practical assessment over two occasions in a cockpit in flight. This 'pilot check ride' assesses specific skills in a range of settings and with variations in weather.
- A viva (oral) interview and structured professional discussion.

All elements must be judged above the minimum threshold in order to achieve success and be certified (see overleaf).

End test assessment thresholds

		Element 1	Element 2	Element 3
		<p><i>Written test (90 minutes) taken in 'ground school' as soon as candidate is judged ready.</i></p> <p>Under examination conditions, the paper is taken blind; the instructor is also unaware which paper will be taken from a random pool of validated end test papers.</p> <p>Weighting (by time and marks):</p> <ul style="list-style-type: none"> 40% structured multiple choice (one answer from six options, none are clearly incorrect); 40% one-line, one-word or short-answer, testing all regulatory aspects including law, documentation requirements and airworthiness checks; 20% extended answers, including scenario and problem solving. 	<p><i>Two 1-hour practical observations (check rides).</i></p> <p>The candidate is required to undertake:</p> <ul style="list-style-type: none"> a full pre-flight regime, preparing and inspecting the aircraft, including working with ground staff (fuel, weather, maintenance and air traffic control); a minimum of five in-flight scenarios covering weather, engine malfunction/aerodynamic stall and communication problems; a full-stop landing. <p>The assessment outcome is recorded via a binary checklist, an observer commentary box and a recommendation to panel. The assessor records a subjective judgment and an objective recommendation on performance. This text is used for any follow-up assessor interview.</p>	<p><i>Final assessment interview (optional element in some countries).</i></p> <p>A full debrief on the examination and check ride. The purpose is to:</p> <ul style="list-style-type: none"> allow the candidate to provide amplification on incidents in flight; describe their response to the scenarios; extend the testing of knowledge and skills. <p>This is useful where performance is marginal and at the competence threshold.</p>
Assessment threshold	Minimum	75	3 minor / 1 major	None
	Maximum	100	No faults	None
	Pass/Fail	30/30/15	Recommended / Not recommended	Validate recommendation
	Recommended	Above 75	Examiner Recommendation	Validated recommendation of Element 2

Refining the end test regime

Each international authority has a delegated ability to refine the end test regime to suit local conditions (for example, Alaskan ice pilots are unable to access neutral examiners in certain months; African countries are unable to simulate certain weather conditions). However, there is a minimum standard that must be visible in all testing regimes, irrespective of location:

- A minimum end test that covers all aspects of the 'syllabus' and tests the mandatory elements of safety and law.
- A practical skills observation in a live scenario that tests the mandatory aircraft handling requirements (pre-flight, stall management, landing, fuelling, start/stop checklists, air traffic control etc.).

Line pilots, those that progress on to advanced modules (instrument, night flying, jet aircraft), and those that progress into commercial aviation are assessed further and the effectiveness of the PPL is reviewed annually. Two such reviews resulted in the creation of the National Private Pilot's License (NPPL) a restricted version of the qualification as the full PPL was deemed too extensive for leisure aviation.

Maintaining assessment consistency

Globally

While the testing regime in different countries may be variable, each one is overseen by a local authority (usually at the level of national Government), or agency (for example, the Nigerian Airline Transport Board, The Federal Aviation Authority, The Brazilian Aviation Authority etc.). Annual statistics are collated by the international authority, ICAO, that issues mandatory changes (based on aircraft safety issues) and advisory bulletins (examples of best practice).

Annually, ICAO updates the syllabus at the top level. In practice, this is limited to major changes in aircraft/aviation law or responses to incidents. One such major change was the inclusion of GPS navigation aids in 2005 and the amendment to testing checklists to accommodate this. All authorities are required to make the mandatory changes and are part of the advisory board for syllabus development.

Locally

Each awarding authority (approved by the relevant government) validates the testing regime and the personnel competent to administer the assessments. In the UK, the Civil Aviation Authority (CAA) licenses instructors and examiners within flight schools to issue PPLs to successful candidates.

Each provider of training (flight school) may produce their own training materials, checklists and examination protocols. These materials are validated against the international requirements as part of the licensing process. There are also standardised support materials produced by independent publishers (text books) that are validated by the international authorities.

Costs and resources

This is a qualification-bearing course of study. Qualifications are necessary so that transferability and comparability can be made (such as taking further training abroad or satisfying a regulatory requirement).

A typical programme:

- takes 50-70 hours of one-to-one tuition at an average cost of £60 per hour (some programmes move to solo practical assessments after 20 hours of tuition);
- includes approximately 12 hours of examination including paper preparation and administration;
- has a significant requirement for resources (aircraft availability, maintenance and consumables).

The cost (excluding aircraft costs) is in the region of £4,000 per PPL. Typical fees charged are in the region of £10,000 and include up to £3,000 of equipment rental, fuel, maintenance, insurances and landing fees.

Who Pays?

There are two mechanisms for funding in general. Both are customer-led:

1. The student pilot pays, either for personal interest or as a self-funded stepping-stone into to a career in commercial aviation.
2. An employer pays as part of an integrated recruitment into commercial aviation. In many cases, the student pays a contribution.

Except for very remote regions where the importance of aviation for transport and communication (central Africa, Alaska, outback Australia) is higher than that of road or rail transport, the government does not contribute to the costs. In remote regions, government funding (at state, regional, or national level) of up to 100% is offered to ensure aviation is part of the national transport network.

Key considerations for Trailblazers

Lessons learned from the PPL programme

- End testing is most effective where there is a series of linked assessments that test, in a live environment, as many scenarios and operations that are likely to be encountered under normal conditions.
- A mixed mode of assessment, that does not favour any one form, is judged as most successful in selecting genuinely competent candidates. The varied assessment format enables a refinement of a numerical mark up and down to generate the recommendation. For example, a technically competent candidate may not perform well in written examinations, but would be, or already is, a competent and safe pilot.
- All candidates are required (under aviation law) to be able to perform mathematical manipulations equivalent to key stage 3 in England and to write at the same level. Therefore, the assessment structure reflects the **minimum** numeracy and literacy requirements **at the start**.
- The aviation business risk is high across all aspects of skills and behaviours requirements and a lack of knowledge can increase the likelihood of an accident or emergency. Regulation mitigates risk as well as does effective training of instructors and examiners across all national regulatory bodies.

Questions for Trailblazers when developing Apprenticeship end testing

- What are the most effective methods for end testing for your standard? How can these be identified and tested?
- Would a mixed mode of end testing generate competent and productive employees?
- What could the mix of end testing be, in a linked and valid protocol?
- What are the threshold performance criteria? How valid are these? Consider:
 - Numerical thresholds (must score over 80% etc.).
 - Competence thresholds – who says they are competent?
 - Interviews as a catch-all, last resort, backstop or filter.
- How likely are employers to trust the Apprenticeship assessment regime? For example, in commercial aviation, airlines operate their own ground school with a uniform syllabus whether the candidate holds a PPL or not. However, a PPL may act as a proxy or as a determining factor where two candidates are otherwise judged as equal.
- How will the end testing strategy be tested for effectiveness? Who will refine and update it in the long term? Who will act as the impetus and authority in the refinement?