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Australian Government
Civil Aviation Safety Authority

ADVISORY CIRCULAR
AC 21-48 v1.0

Type certification of powered-lift aircraft

File ref: D25/312185

November 2026

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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.

Advisory circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.

Advisory circulars should always be read in conjunction with the relevant regulations.

Audience

This advisory circular (AC) applies to:

- designers and manufacturers of powered-lift aircraft
- importers of foreign type-certified powered-lift aircraft.

Purpose

This AC provides guidance on CASA'S certification processes and applicable airworthiness standards for powered-lift aircraft. Within the context of this document, powered-lift aircraft encompass novel aircraft designs having features of both conventional rotorcraft and fixed wing aircraft, intended for point-to-point passenger or cargo transport.

For further information

For further information or to provide feedback on this AC, visit CASA's contact us page.

Status

This version of the AC is approved by the National Manager, Airworthiness and Engineering Branch.

Table 1: Status

Version	Date	Details
v1.0	November 2026	Draft for consultation.

Unless specified otherwise, all subregulations, regulations, Divisions, Subparts and Parts referenced in this AC are references to the *Civil Aviation Safety Regulations 1998 (CASR)*.

Contents

1 Reference material 5

1.1 Acronyms 5
1.2 Definitions 5
1.3 References 6

2 Background 8

3 Type certification of powered-lift aircraft 9

3.1 Special Class aircraft 9
3.2 FAA Powered Lift Airworthiness Criteria 10
3.3 EASA Special Condition for VTOL (SC-VTOL) 11

4 Type validation and acceptance of powered-lift aircraft 13

4.1 Recognised Countries 13
4.2 Type validation 13
4.3 International Agreements 13

1 Reference material

1.1 Acronyms

The acronyms and abbreviations used in this AC are listed in the table below.

Table 2: Acronyms

Acronym	Description
AAM	advanced air mobility
CASA	Civil Aviation Safety Authority
CASR	*Civil Aviation Safety Regulations 1998*
CoA	certificate of airworthiness
EASA	European Union Aviation Safety Agency
FAA	Federal Aviation Administration of the USA
MoC	means of compliance
NAA	National Airworthiness Authority
TAC	type acceptance certificate
TC	type certificate
VTOL	vertical take-off and lift

1.2 Definitions

Terms that have specific meaning within this AC are defined in the table below. Where definitions from the civil aviation legislation have been reproduced for ease of reference, these are identified by 'grey shading'. Should there be a discrepancy between a definition given in this AC and the civil aviation legislation, the definition in the legislation prevails.

Table 3: Definitions

Term	Definition
advanced air mobility	An air transportation system that moves people and cargo between local, regional, intraregional, and urban locations not previously served or underserved by aviation using innovative aircraft, technologies, and operations.
airworthiness	The condition of an item (aircraft, aircraft system, or part) in which that item operates in a safe manner to accomplish its intended function.
certificate of airworthiness	The process of assessing an aircraft against its type design and ensuring the aircraft is in condition for safe operation. A satisfactory completion of this process would culminate in the issue of a CoA for the individual aircraft.
powered-lift aircraft	A power-driven heavier-than-air aircraft that derives its lift in flight: (a) during vertical manoeuvring and low-speed flight—from: (i) the reaction of air on one or more normally power-driven rotors on substantially vertical axes; or

Term	Definition
	(ii) engine thrust; and (b) otherwise chiefly from aerodynamic reactions on surfaces remaining fixed under given conditions of flight.
type acceptance	The process undertaken by CASA to ensure the requirements for aircraft and systems are sufficiently correct and complete, applicable to aircraft originating from a recognised country under regulation 21.010B of CASR.
type certificate	Defined as per CASR 21.041, a type certificate, for an aircraft, aircraft engine or propeller, means a type certificate issued by CASA under regulation 21.013 or 21.029 of CASR, certifying that the aircraft, aircraft engine or propeller meets the airworthiness standard mentioned for it in the certificate. The issuance of a TC is a legal recognition that a product complies with the applicable airworthiness standards.
type certification	The process of evaluation and approval of aircraft type design data against designated airworthiness standards that culminates in the initial of a Type Certificate (TC). It is a prerequisite for the issue of a Certificate of Airworthiness (CoA).
type validation	The process undertaken by CASA to ensure the requirements for an aircraft or its systems are sufficiently correct and complete. This is applicable to powered-lift aircraft originating from a non-recognised country under regulation 21.010B of CASR, and may involve a more detailed examination than Type Acceptance.

1.3 References

Legislation

Legislation is available on the Federal Register of Legislation website https://www.legislation.gov.au/

Table 4: Legislation references

Document	Title
Part 21 of CASR	Certification and airworthiness requirements for aircraft and parts

Advisory material

CASA's advisory materials are available at https://www.casa.gov.au/publications-and-resources/guidance-materials

Table 5: Advisory material references

Document	Title
AC 20-02	Recognised countries and international agreements
AC 21-10	Experimental certificates
AC 21-13	Australian-designed aircraft - type certification
AC 21-30	Type acceptance certificates for imported aircraft
AC 21-31	Type certificates for imported aircraft

International Civil Aviation Organization documents

International Civil Aviation Organization (ICAO) documents are available for purchase from http://store1.icao.int/

Many ICAO documents are also available for reading, but not purchase or downloading, from the ICAO eLibrary (https://elibrary.icao.int/home).

Table 6: ICAO references

Document	Title
ICAO Annex 7	Aircraft Nationality and Registration Marks
ICAO Annex 8	Part II. Chapter 1 Type Certification

Other reference material

Table 7: Other reference material

Document	Title
EASA SC-VTOL	Special Condition for small-category VTOL-capable aircraft, Issue 2
FAA AC 21.17-04	Type Certification - Powered-lift
FAA PS-AIR-21.17-01	Safety Continuum for Powered-lift

2 Background

2.1 Powered-lift aircraft are innovative aircraft intended for point-to-point passenger and cargo-carrying operations typically at low altitudes. They incorporate novel design features such as battery-electric propulsion and are an example of new aviation technologies that will play an important role in the future of advanced air mobility (AAM).

2.2 The guidance presented in this (AC has been developed with appropriate consideration of the policies, regulations, and standards being established by other national aviation authorities (NAAs). By maintaining alignment and harmonisation with other NAAs, CASA aims to facilitate the acceptance and transferability of powered-lift aircraft, including aircraft designed and type certificated in Australia.

2.3 Specific guidance for powered-lift aircraft is needed because novel features of these aircraft typically are not adequately addressed by the existing airworthiness standards for aeroplanes and rotorcraft under Parts 23, 27, 33, and 35 of CASR. To address these novel design features, and to support the ongoing evolution of powered-lift aircraft technologies, CASA has chosen to align with other leading NAAs by adopting a 'safety continuum' approach to certification, supported by a performance-based approach to the certification of powered-lift aircraft.

2.4 This AC outlines airworthiness requirements and the regulatory processes for the type certification, type acceptance and type validation of powered-lift aircraft in accordance with Part 21 of CASR.

2.5 Prospective applicants for type certification who would seek to undertake flight operations with powered-lift aircraft should also ensure that relevant operational requirements and personnel licensing issues are also complied with, in accordance with Parts 61, 91, and 133 of CASR. CASA encourages applicants to contact CASA early in the product development process to ensure applicable requirements are identified.

2.6 Certain kinds of operations of powered-lift aircraft that are not by their nature type certificated may be carried out under an experimental certificate of airworthiness. Refer to AC 21-10 - Experimental certificates for information on the operations permitted with an experimental certificate.

3 Type certification of powered-lift aircraft

3.1 Special Class aircraft

3.1.1 In the absence of established airworthiness requirements for powered-lift aircraft in the civil aviation legislation, and recognising the evolving nature of powered-lift aircraft technologies and their associated airworthiness requirements, powered-lift aircraft are currently type certificated by CASA as 'special class' aircraft under subregulation 21.017(2) of CASR.

3.1.2 Special class aircraft include certain non-conventional aircraft, such as powered-lift aircraft and novel rotorcraft, for which specific airworthiness requirements have not been prescribed under the existing civil aviation regulations.

3.1.3 In general, for special class aircraft, applicable airworthiness requirements are established by identifying suitable drawn from existing airworthiness standards such as Parts 23, 27, 33 and 35 of CASR, and, where necessary, alternative or additional airworthiness requirements, in order to provide an equivalent level of safety to existing standards.

3.1.4 For the type certification of powered-lift aircraft, the applicant and CASA will identify and agree applicable airworthiness requirements for the certification project on a case-by-case basis.

3.1.5 CASA has identified two sources of airworthiness requirements that may form a suitable certification basis for applicants proposing the certification of a powered-lift aircraft:

1. FAA Powered Lift airworthiness criteria (as outlined in FAA AC 21.17-4)
2. EASA Special Condition for VTOL capable aircraft (EASA SC-VTOL).

3.1.6 The guidance in AC 21-13 - Australian designed aircraft – type certification may be consulted for further information regarding the requirements and procedures involved in the aircraft type certification process, and the responsibilities of the industry applicants, authorised engineering representatives and CASA staff.

3.1.7 Unique, novel, or unusual design features may require alternative or additional airworthiness criteria, particularly in cases where the existing airworthiness requirements and underpinning technical standards do not adequately address performance and certification aspects of these technologies. An example would be novel propulsion technologies such as hydrogen fuel cells.

3.1.8 Early engagement with CASA is encouraged to support the efficient planning and conduct of the certification project, including the identification of additional or alternative airworthiness criteria.

3.1.9 The following diagram is a simplified illustration of how a suitable certification basis for a powered-lift aircraft type certification project may be established:

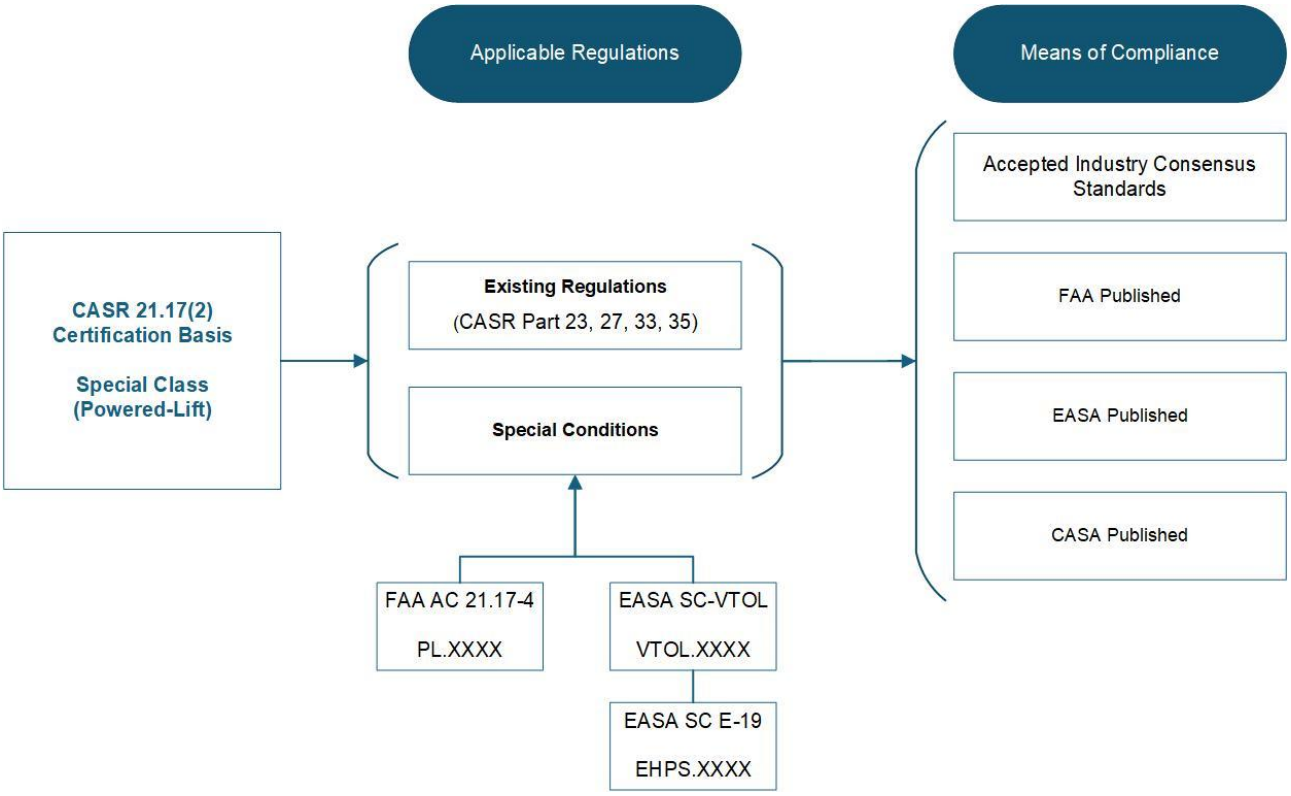


Figure 1: Airworthiness requirements and means of compliance (MOC) for a powered-lift aircraft

3.2 FAA Powered Lift Airworthiness Criteria

3.2.1 The FAA advisory circular AC 21.17-4, Type Certification - Powered-lift[1], which provides guidance for type, production, and airworthiness certification of powered-lift aircraft. This is accompanied by the FAA Policy Statement PS-AIR-21.17-01, Safety Continuum for Powered-lift[2], outlining the FAA's approach for establishing a safety continuum for the certification of powered-lift aircraft.

3.2.2 Under the safety continuum, 4 certification levels are established, based on the aircraft's maximum gross weight and passenger seating capacity. The safety continuum proposes a graduated approach to compliance and corresponding safety objectives for each certification level, with the intent of providing a level of safety commensurate to the risk presented by the aircraft.

3.2.3 FAA powered-lift certification levels are shown in Table 8.

Table 8: FAA Powered-Lift Certification Levels

Maximum Passenger Seating Configuration and Maximum Gross Weight	Powered-Lift Certification Levels
0-1 Passengers & ≤ 12,500 lbs.	1
2-6 Passengers & ≤ 12,500 lbs.	2

[1] AC 21.17-4 - Type Certification----Powered-lift

[2] PS-AIR-21.17-01 Safety Continuum for Powered-lift

Maximum Passenger Seating Configuration and Maximum Gross Weight	Powered-Lift Certification Levels
7-9 Passengers & ≤ 12,500 lbs.	3*
10-19 Passengers or > 12,500 lbs.	4*

Note: *Not currently addressed in FAA AC 21-17-04.

3.2.4 The airworthiness criteria presented in FAA AC 21.17-04 are applicable for powered-lift aircraft with:

- a maximum gross weight of 5 700 kg (12 500 lbs) or less
- a maximum passenger count of six (6) or les
- battery electric engine(s) for propulsion.

3.2.5 The criteria also identify two applicable performance capability requirements:

1. essential performance:
   - meaning, in the event of a critical change of thrust, the aircraft has no guaranteed climb capability but is capable of controlled flight and an unscheduled landing is assumed.
2. increased performance:
   - meaning, in the event of a critical change of thrust, the aircraft is capable of climbing to a safe altitude, on a flightpath clear of obstacles, and maintaining level flight to a planned destination, a diversion location, or the point of departure.

3.3 EASA Special Condition for VTOL (SC-VTOL)

3.3.1 EASA SC-VTOL-02[3] Special Condition for small-category VTOL-capable aircraft, prescribes the airworthiness standards applicable to the type certification of small-category, person-carrying VTOL-capable aircraft that use lift/thrust units for powered-lift and flight control, considering their novel design characteristics.

3.3.2 EASA SC-VTOL is applicable to VTOL aircraft with:

- a passenger seating configuration of 9 or less
- a maximum certified take-off mass of 5,700 kg (12,500 lbs) or less
- a maximum structural cruising speed (VNO) ≤ 250 knots calibrated airspeed (KCAS)
- an unpressurised cabin.

3.3.3 EASA identifies two categories of VTOL aircraft to establish the required level of safety and performance objectives:

1. **Category Enhanced:**
   - the aircraft is capable of continued safe flight and landing, intended for operations over congested areas or for Commercial Air Transport operations involving the carriage of passengers.

[3] Special Condition for VTOL and Means of Compliance | EASA

2. Category Basic:

- the aircraft is capable of a controlled emergency landing.

3.3.4 EASA SC-VTOL-02 does not cover design requirements for engines and propellers. For type certification, applicants must refer to other applicable standards such as Part 33 of CASR and Part 35 of CASR.

4 Type validation and acceptance of powered-lift aircraft

4.1 Recognised countries

4.1.1 For powered-lift aircraft that have previously been issued a type certificate by the NAA of a recognised country[4], CASA undertakes type acceptance activity in accordance with regulation 21.029A of CASR. AC 21-30 - Type acceptance certificates for imported aircraft, provides further guidance on the process.

4.1.2 Type acceptance provides a streamlined process for the recognition of certain type certificates for aircraft, where those type certificates have been issued by the NAA of a recognised country. Due to the novel design features and operational characteristics of powered-lift aircraft, CASA may require applicants for TACs to furnish additional technical information to CASA to meet its obligations as a State of Registry for the aircraft. Information furnished would typically be used to verify the applicable airworthiness requirements that have been identified in the certification basis of the powered-lift aircraft, including any special conditions or equivalent level of safety (ELOS) findings, and to confirm the airworthiness of the type certificated aircraft.

4.1.3 Upon successful review, for these aircraft CASA will issue a type acceptance certificate under the Special Class aircraft category, or a category consistent with the TC issued by the foreign country. If an appropriate aircraft category is not listed on the TC, CASA will determine an appropriate category to be listed on the TAC, including any applicable restrictions, in accordance with subregulation 21.029B (2) of CASR.

4.2 Type validation

4.2.1 For powered-lift aircraft that have been type certificated by the NAA of other than a recognised country, CASA undertakes a type validation in accordance with regulation 21.029 of CASR. Type validation typically involves a more detailed and significant review of the applicable airworthiness requirements for the powered-lift aircraft, and a more exhaustive review of the conformity of the aircraft to its type design. AC 21-31 - Type certificates for imported aircraft, provides further guidance on this process.

4.3 International Agreements

4.3.1 CASA has established international agreements and arrangements with other NAA, which may streamline regulatory processes for the type acceptance and type validation of powered-lift aircraft. AC 20-02 - Recognised countries and international agreements provides details of recognised countries and international agreements for certification and design approvals, and maintenance.

4.3.2 These agreements and arrangements also support the exchange of certification data and documentation, promote the alignment of airworthiness standards, and can be used to facilitate CASA sequentially validating a type design as it is undergoing type certification with the state of design NAA.

[4] CASR 21.010A, CASR 21.010B