
Type Acceptance Report

TAR 3/21B/28 – Revision 1

ROBINSON R44 Series

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Executive Summary

New Zealand Type Acceptance has been granted to the Robinson Helicopters R44 Series based on validation of FAA Type Certificate number H11NM. There are no special requirements for import.

Applicability is currently limited to the Models and/or serial numbers detailed in Section 2, which are now eligible for the issue of an Airworthiness Certificate in the Standard Category in accordance with NZCAR §21.191, subject to any outstanding New Zealand operational requirements being met. (See Section 5 of this report for a review of compliance of the basic type design with the operating Rules.) Additional variants or serial numbers approved under the foreign type certificate can become type accepted after supply of the applicable documentation, in accordance with the provisions of NZCAR §21.43(c).

NOTE: The information in this report was correct as at the date of issue. The report is generally only updated when an application is received to revise the Type Acceptance Certificate. For details on the current type certificate holder and any specific technical data, refer to the latest revision of the State-of-Design Type Certificate Data Sheet referenced herein.

1. Introduction

This report details the basis on which Type Acceptance Certificate No. 3/21B/28 was granted in the Standard Category in accordance with NZCAR Part 21 Subpart B.

Specifically, the report aims to:

- (a) Specify the foreign type certificate and associated airworthiness design standard used for type acceptance of the model(s) in New Zealand; and
- (b) Identify any special conditions for import applicable to any model(s) covered by the Type Acceptance Certificate; and
- (c) Identify any additional requirements which must be complied with prior to the issue of a NZ Airworthiness Certificate or for any subsequent operations.

The report notes the status of all models included under the State-of-Design type certificate which have been granted type acceptance in New Zealand, which are listed in Section 2. Appendix 1 details the type acceptance history under CAR Part 21B and which models were certificated prior to that under NZCAR Section B.9 and are now type accepted under the transitional arrangements of Part 21 Appendix A(c).

2. Aircraft Certification Details

(a) State-of-Design Type and Production Certificates:

Manufacturer: Robinson Helicopter Company
Type Certificate: H11NM
Issued by: Federal Aviation Administration
Production Approval: FAA PC424WE

(b) Models Covered by the Part 21B Type Acceptance Certificate:

(i) **Model:** R44

Configuration:	R44 Raven I	R44 Cadet
Serial Numbers:	MSN 2 – 9999	MSN 30001 and up
MCTOW:	2400 lb. [1088 kg]	2200 lb. [998 kg]
Max. No. of Seats:	4	2
Noise Standard:	FAR 36-20	FAR 36-30

Engine: Lycoming O-540-F1B5
Type Certificate: E-295
Issued by: Federal Aviation Administration

(ii) **Model:** R44 II

MCTOW:	2500 lb. [1134 kg]
Max. No. of Seats:	4
Noise Standard:	FAR 36-24

Engine: Lycoming IO-540-AE1A5
Type Certificate: 1E4
Issued by: Federal Aviation Administration

3. Application Details and Background Information

The Robinson R44 was originally accepted into New Zealand under the provisions of NZCAR B.9. The first-of-type certificate of airworthiness was issued to serial number 0030 registered ZK-HJD in January 1994. The Robinson R44 is a four-place all-metal piston-powered light helicopter with a single teetering main rotor blade system, conventional tail rotor and skid landing gear.

The first application for New Zealand type acceptance under Part 21B was for the R44 II from the NZ agent, Skysales Aviation (NZ) Ltd, dated 21 February 2003. The first-of-type example was serial number 10034 registered ZK-HTW.

Type Acceptance Certificate Number 3/21B/28 was granted on 13 March 2003 to the Robinson R44 II based on validation of FAA Type Certificate H11NM. There are no special requirements for import into New Zealand.

This report was raised to Revision 1 to add the commercial model R44 “Cadet”, which is a specific 2-seat configuration of the Model R44. Type acceptance was granted on 26 January 2022.

The R44 is essentially a four-seat enlarged version of the R22 with the same two-blade rotor system; T-bar cyclic stick control; aluminium monocoque pilot cabin and tailboom, and a steel-tube structure supporting the engine, transmission and rotor system. It is fitted with a six-cylinder Lycoming O-540 engine, de-rated to 225 shp for take-off and 205 shp continuous. The first R44 was fitted with manual flight controls and was known as the Astro. RHC subsequently introduced hydraulically-assisted flight controls, and the R44 then became known as the Raven 1.

The R44 “Cadet” is basically the same helicopter except for changes to convert into a two-seat version. The rear seats are removed and the engine is further de-rated to 210 shp take-off and 185 shp continuous power. Like the R44 this is accomplished by placarded Manifold Pressure limitations. The MAUW is reduced to 2200 lb., which will reduce stress on components. In conjunction with lower engine power this allows overhaul or replacement for life-limited parts to be extended to 2400 hours. It will also result in improved performance margins compared to a loaded R44 Raven I. The Cadet is designed to be a less expensive version intended for the flight training role.

The R44 II is a development of the R44 with a 245 shp take-off rating injected version of the six-cylinder Lycoming engine, for improved performance at altitude, and a 100 lb. increase in MTOW, primarily to compensate for a higher empty weight. Minor changes include a revised fuel system including electric fuel pump; incidental changes to engine controls and instruments; slightly increased area of main rotor blades (increased chord on the outer 1/3 of the span, to reduce vibration and blade stresses at altitude); strengthening of some main rotor control system components; the addition of aerodynamic (rounded) tip caps to the main and tail rotor blades, for reduced noise; and a 28-volt electrical system to aid starting.

4. NZCAR §21.43 Data Requirements

The type data requirements of NZCAR Part 21B Para §21.43 have been satisfied by supply of the following documents, or were already held by the CAA:

(1) State-of-Design Type certificate:

FAA Type Certificate Number H11NM

FAA Type Certificate Data Sheet H11NM at Revision 10 dated October 6, 2020

– Model R44 approved December 10, 1992

– Model R44 II approved October 3, 2002

(2) Airworthiness design requirements:

(i) *Airworthiness Design Standards:*

The certification basis of the R44 Series is FAR Part 27, dated February 1, 1965, including Amendments 27-1 through 27-24. (However RHC advise they elected to comply with the latest amendment of Part 27 for the R44 II engine installation, except as noted in the Compliance Checklist.) The FAA applied one Special condition and three equivalent level of safety findings were made. There have been reviewed and accepted by CAA. The certification basis was updated to Amendment 27-30 (except for a puncture force of 250 lb.) for the crash-resistant fuel system [CRFS] fitted in production to serial numbers detailed on the TCDS, which is also specified as mandatory for those serial numbers when operating in US airspace. CRFS bladder tanks may be retrofitted under the provisions of SB-78B. Note: This is now mandatory for all R44 helicopters in New Zealand under Airworthiness Directive DCA/R44/30.

This is an acceptable certification basis in accordance with CAR Part 21B Para §21.41, because FAR 27 is the basic standard for rotorcraft called up under Part 21 Appendix C. There are no non-compliances and no special conditions have been prescribed by the Director under §21.23. (The original R44 type acceptance in NZ was documented under TAR 7/93.)

(ii) *Special Conditions:*

No. 27-033-SC Installation of HeliSAS Autopilot and Stabilization Augmentation System (AP/SAS) – As an option the AP/SAS performs non-critical control functions. However, the possible failure conditions, and their effect on the continued safe flight and landing, are more severe than envisioned by the present rules for light helicopters. RHC was required to provide a systems safety assessment (SSA) for the final configuration that will adequately address the safety objectives established by a functional hazard assessment (FHA) and a preliminary system safety assessment (PSSA), including the fault tree analysis (FTA). Other considerations include software design assurance and the installation environment.

(iii) *Equivalent Level of Safety Findings:*

Number AT16516LA-R-S-1 – §27.695(a)(1) Power boost and power-operated control system: The rule requires an alternate power-operated control system to be available so the R44 can be flown and landed safely in the event of any single failure. RHC petitioned to use a simple cost-effective hydraulic actuator based on the Bell 206 design, which has a proven reliability history free of any accidents resulting from jamming. The exemption was subsequently replaced by this ELOS, which is based on a control valve design that averts any single failure mode of the power portion of the system that prevents continued safe flight.

Number TD10352LA-R/S-1 – §27.1401(d) Anti-collision Light System: RHC was granted an ELOS to replace the red anti-collision light lens with a combination red and white lens. This design, incorporating a forward-facing red segment and an aft-facing white segment, increases the visual conspicuity of the helicopter without affecting cockpit reflections.

Number AT17187LA-R/P-1 – §27.952(c)(1)(i) Breakaway coupling separation load: The FAA Reauthorization Act of 2018 (“Section 317”) requires that all newly-produced helicopters after April 5, 2020 comply with the latest amendment of §27.952 for fuel system crash resistance. §27.952 (c) requires self-sealing breakaway couplings to prevent fuel spillage if components are displaced in a crash. For fuel lines with breakaway couplings the separation load must be no less than 300 pounds. RHC designed a self-sealing breakaway coupling for the R44 and R44 II fuel system with a separation load of approximately 250 pounds. This meets the intent of paragraph §27.952(c)(1)(i) because the RHC design places the coupling in-line in a flexible hose assembly. Measurable, visible hose slack and stretch would need to be taken up before any significant load would be applied to the coupling. The coupling is also shielded from inadvertent access by surrounding structure and components. Therefore, the ground maintenance failures the 300 lb load is intended to protect against would be highly unlikely.

(iv) Exemptions:

Exemption numbers 5473 for the R44 and 6692 for the R44 II have been superseded by the ELOS detailed above. (This was required for validation of the type certificate by EASA, whose rules do not provide for exemptions.)

(v) Airworthiness Limitations:

See the MM Chapter 3 Section 3.300 Airworthiness Limitations

(3) Aircraft Noise and Engine Emission Standards:

(i) Environmental Standard:

The Model R44 Series has been certificated for noise under FAR Part 36. (Amendments 36-20 for the R44, 36-24 for the R44 II, and 36-30 for the Cadet.)

(ii) Compliance Listing:

RHC Report RTR 436 – Noise Test Substantiation

See RFM Section 5 Performance.

	R44	R44 II	R44 Cadet
Engine:	O-540 (225 shp)	IO-540 (245 shp)	O-540 (210 shp)
Gross Weight:	2400 lb.	2500 lb.	2200 lb.
Flyover Sound Exposure Level (SEL):	81.9 dB(A) C169-3 muffler 78.9 dB(A) C169-36 muffler	80.9 dB(A)	78.2 dB(A)

(4) Certification Compliance Listing:

RHC Report RTR 402 – R44 Weight and Balance

RHC Report RTR 403 – R44 External Loads Proposal

RHC Report RTR 410 – R44 Fuselage Structural Substantiation

RHC Report RTR 415 – R44 Cabin Interior Structural Substantiation

RHC Report RTR 423 – R44 Electrical Load Analysis

RHC Report RTR 425 – R44 Flight Test Proposal and Data

RHC Report RTR 433 – R44 Compliance Checklist

RHC Report RTR 440 – R44 Electrical System Load Test

RHC Report RTR 472 – Substantiation of IO-540 Engine Installation – Rev.E

Project Specific Certification Plan (PSCP) – Project No. AT16422LA-R – R44 Cadet – Revision A dated 12 January 2016

RHC Report 468 – R44 Cadet Substantiation

(5) Flight Manual: Robinson R44 Pilot's Operating Handbook and FAA Approved Rotorcraft Flight Manual – Document RTR 461
CAA Accepted as AIR 2479

Robinson R44 II Pilot's Operating Handbook and FAA Approved Rotorcraft Flight Manual – Document RTR 462
CAA Accepted as AIR 2821

Robinson R44 Cadet Pilot's Operating Handbook and FAA Approved Rotorcraft Flight Manual – Document RTR 463
CAA Accepted as AIR 3490

(6) Operating Data for Aircraft and Engine:

(i) *Maintenance Manual:*

R44 Maintenance Manual and Instructions for Continued Airworthiness – Document RTR 460 Volume I

(ii) *Current service Information:*

R44 Service Bulletins and R44 Service Letters

(iii) *Illustrated Parts Catalogue:*

R44 Illustrated Parts Catalog – Document RTR 460 Volume II

(7) Agreement from manufacturer to supply updates of data in (5), and (6):

CAA 2171 form for R44 II from RHC V.P. Engineering dated 20 February 2003. Publications are now available on the RHC website at www.robinsonheli.com

(8) Other Information:

EASA Operational Suitability Data (OSD) Flight Crew Data R44 – Doc. RTR 465

FAA Master Minimum Equipment List – Robinson R22, R22 Alpha, R22 Beta, R22 Mariner (H10WE) – R44, R44 II (H11NM)

RHC Report RTR 423 – R44 Electrical Load Analysis

(9) CAA Comments on Original R44 Validation:

There was one comment as a result of the CAA inspection of the R44. There were no 'designated' emergency exits on the aircraft under §27.807, which presumably means that all four doors carry out that function. However none of the door operating controls or instruction placards were red, as required by §27.1557(d). The main concern was with the rear door locking knob. This was an anonymous black knob with no instructions. If the door was locked a rear passenger unfamiliar with the aircraft might be unable to open the door and evacuate the aircraft. (They may be able to use the front door but if they were expected to do so it would also be expected that the door would be designated an emergency exit.)

RHC advised a placard stating "Push to Lock" was added at the rear door locking knob in October 1993. This was revised in June 2011 to read "Push to Lock, Do Not Lock in Flight".

5. New Zealand Operational Rule Compliance

Compliance with the retrospective airworthiness requirements of CAR Part 26 is a prerequisite for the grant of a type acceptance certificate.

Civil Aviation Rules Part 26

Subpart B – Additional Airworthiness Requirements

Appendix B – All Aircraft

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
B.1	Marking of Doors and Emergency Exits	<i>To be determined on an individual aircraft basis</i>
B.2	Crew Protection Requirements – CAM 8 Appendix. B #.35	Not Applicable – Agricultural aircraft only

Appendix E - Helicopters

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
E.1	Doors and Exits	FAR §27.783 and FAR §27.807(b)(2) – Simple direct-action levers comply with this requirement
E.2.1	Emergency Exit Marking	FAR §27.807(b)(3) and FAR §27.1557(d)

Compliance with the following additional New Zealand operating requirements has been reviewed and were found to be covered by either the original certification requirements or the basic build standard of the aircraft, except as noted:

Civil Aviation Rules Part 91

Subpart F – Instrument and Equipment Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
91.505	Shoulder Harness if Aerobatic; >10 pax; Flight Training	FAR §27.785(b) – Four-point safety harness is an option
91.507	Pax Information Signs – Smoking, safety belts fastened	N/A – Certificated seating capacity less than ten pax. seats
91.509 Min. VFR	(1) ASI FAR §27.1303(a) – Fitted as Standard – See POH Section 7 (2) Machmeter N/A – No Mach limitations (3) Altimeter FAR §27.1303(b) – Fitted as Standard – See POH Section 7 (4) Magnetic Compass FAR §27.1303(c) – Fitted as Standard – See POH Section 7 (5) Fuel Contents FAR §27.1305(d) – Fitted as Standard – See POH Section 7 (6) Engine RPM FAR §27.1305(k) – Fitted as Standard – See POH Section 7 (7) Oil Pressure FAR §27.1305(h) – Fitted as Standard – See POH Section 7	(8) Coolant Temp N/A – Air-cooled engine (9) Oil Temperature FAR §27.1305(j) – Fitted as Standard – See POH Section 7 (10) Manifold Pressure FAR §27.1305(e) – Fitted as Standard – See POH Section 7 (11) Cylinder Head Temp FAR §27.1305(b) – Fitted as Standard – See POH Section 7 (12) Flap Position N/A – Helicopter (13) U/c Position N/A – Fixed undercarriage (14) Ammeter/Voltmeter FAR §27.1351(d) – Fitted as Standard – See POH Section 7
91.511 Night	(1) Turn and Slip (2) Position Lights Turn co-ordinator optional fit FAR §27.1385	(3) Anti-collision Lights FAR §27.1401 (4) Instrument Lighting FAR §27.1381
91.513	VFR Communication Equipment	Operational Requirement – Compliance as applicable
91.517	IFR Instruments and Equipment	Not Applicable – The R44 is only approved for VFR flight
91.519	IFR Communication and Navigation Equipment	Not Applicable – The R44 is only approved for VFR flight
91.523 Emrgcy Eqpmt.	(a) More Than 10 pax – First Aid Kits per Table 7 – Fire Extinguishers per Table 8 (b) More than 20 pax – Axe readily acceptable to crew (c) More than 61 pax – Portable Megaphones per Table 9	Not Applicable – Less than 10 passengers Not Applicable – Less than 10 passengers Not Applicable – Less than 20 passengers Not Applicable – Less than 61 passengers
91.529	ELT – TSO C91a after 1/4/97 (or replacement)	<i>To be determined on an individual aircraft basis</i>
91.531	Oxygen Indicators – Volume/Pressure/Delivery	Oxygen System not fitted as standard
91.533	Oxygen for un-pressurised aircraft	Density Altitude Limit – 14,000 ft. However maximum altitude above ground level is 9000 ft. to allow landing within five minutes in case of fire.
91.541	SSR Transponder and Altitude Reporting Equipment	Operational Requirement – Compliance as applicable
91.543	Altitude Alerting Device – Turbojet or Turbofan	Not Applicable – Not turbo jet or turbopfan powered
91.545	Assigned Altitude Indicator	Not Applicable – The R44 is only approved for VFR flight
A.15	ELT Installation Requirements	<i>To be determined on an individual aircraft basis</i>

Civil Aviation Rules Part 135

Subpart F – Instrument and Equipment Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
135.355	Seating/Restraints – Shoulder harness – flight-crew seats	FAR §27.785(b)
135.357	Additional Instruments (Powerplant and Propeller)	FAR §27.1305
135.359	Night Flight	Landing light, Passenger compartment
135.361	IFR Operations	Speed, Altitude, spare bulbs/fuses
135.363	Emergency Equipment (Part 91.523 (a) and (b))	Operational Requirement – Compliance as applicable
135.367	Cockpit Voice Recorder	Not Applicable – Less than 10 passenger seats
135.369	Flight Data Recorder	Not Applicable – Less than 10 passenger seats
135.371	Additional Attitude Indicator	Not Applicable – Not turbo jet or turbofan powered

- NOTES: 1. A Design Rule reference in the Means of Compliance column indicates the Design Rule was directly equivalent to the CAR requirement, and compliance is achieved for the basic aircraft type design by certification against the original Design Rule.
2. The CAR Compliance Tables above were correct at the time of issue of the Type Acceptance Report. The Rules may have changed since that date and should be checked individually.
3. Some means of compliance above are specific to a particular model/configuration. Compliance with Part 91/119 operating requirements should be checked in each case, particularly oxygen system capacity and emergency equipment.

Attachments

The following documents form attachments to this report:

Copy of FAA Type Certificate Data Sheet Number H11NM

Sign off



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David Gill
Team Leader Aircraft Inspection



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Checked – Rens Molenaar
Certification Engineer

Appendix 1

List of Type Accepted Variants:

<i>Model:</i>	<i>Applicant:</i>	<i>CAA Work Request:</i>	<i>Date Granted:</i>
R44	AC 21-1.2/NZCAR Part 21 Appendix A(c)		
R44 II	Robinson Helicopter Company	3/21B/28	13 March 2003
R44 Cadet	Robinson Helicopter Company	22/21B/10	26 January 2022

Appendix 2

Three-view drawing Robinson R44 Cadet.

