
Type Acceptance Report

TAR 11/21B/29

BELL 427

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
1. INTRODUCTION	1
2. ICAO TYPE CERTIFICATE DETAILS	1
3. TYPE ACCEPTANCE DETAILS	2
4. NZCAR §21.43 DATA REQUIREMENTS	3
5. ADDITIONAL NEW ZEALAND REQUIREMENTS	6

Executive Summary

New Zealand Type Acceptance has been granted to the Bell Model 427 based on validation of Transport Canada Type Certificate number H-103. There are no special requirements for import.

All serial numbers 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.)

1. Introduction

This report details the basis on which Type Acceptance Certificate No. 11/21B/29 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 in New Zealand; and
- (b) Identify any special conditions for import applicable to any model 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.

2. ICAO Type Certificate Details

Manufacturer:	Bell Helicopter Textron Canada Limited
Type Certificate:	H-103
Issued by:	Transport Canada
Model:	427
MCTOW	6350 lb. [2880 kg] Internal loading 6550 lb. [2971 kg] External loading or S/N 56043 and up, or earlier S/N with IGW Kit 427-706-021
Max. No. of Seats:	8
Noise Standard:	ICAO Annex 16
Engine:	Pratt & Whitney Canada PW207D
	Type Certificate: E-23
	Issued by: Transport Canada

3. Type Acceptance Details

The application for New Zealand type acceptance was from the manufacturer, Bell Helicopter Textron Canada Ltd (BHTCL) dated 23 June 2011. The first-of-type example was serial number 56017, registered ZK-HVN. The Bell Model 427 is an eight-seat twin-turbine helicopter with four-bladed main rotors and conventional tailrotor configuration, with a composite-construction fuselage and skid landing gear. It is approved for day/night VFR operations with engine isolation, and is certificated for Category A operations when Kit 427-706-025 is installed. Standard equipment is an Integrated Instrument Display System (IIDS) which shows engine and systems status and warning annunciations.

Type Acceptance Certificate No. 11/21B/29 was granted on 30 August 2011 to the Model 427 based on validation of Transport Canada Type Certificate H-103. (The PW207D engine was previously Type Accepted under 11/21B/11.) Specific applicability is limited to the coverage provided by the operating documentation supplied. There are no special requirements for import into New Zealand.

The Bell 427 was an all-new design of intermediate-size helicopter. It was developed in partnership with Samsung Aerospace Industries, who produced a significant part of the airframe structure including fuselage sidebodies, nose, floors and tailboom. Manufacture of all other components takes place in the US and Canada, with final assembly completed at BHTCL Mirabel. It was originally certificated at 6000 lb. MAUW, but the empty weight had increased during development and a program was instituted to raise the MAUW in two stages. The first approved an increase to 6350 lb MAUW, which was the production standard from S/N 56025. All existing helicopters have now been upgraded by a retrofit program, and the original Flight Manual BHT-427-FM-1 has been cancelled. A further increase to 6650 lb MAUW was production incorporated from S/N 56043. Because it is only optional the provision is contained in a Flight Manual Supplement FMS-7 or FMS-23. (The physical changes to the aircraft include the installation of a different V_{NE} placard, addition of cold worked holes in the tailboom and reduction of life limits for the landing gear and main rotor shear bearing.) A total of 84 examples of the Model 427 were produced by Bell before it was superseded in production by the Model 429. Two examples were also manufactured by Samsung in Korea, S/N 58001 and 58002. Although these are on the Type Certificate they are not eligible for FAA airworthiness certification.

NOTE: The Bell 427 is also covered by FAA Type Certificate R00001RC. Bell advises that the type design is identical for both type certificates and use the same flight manual. (Although the FAA has not approved Category A operations.) See Alert Service Bulletin ASB 427-01-05 for details of the Common Configuration. The State-of-Design type certificate is the basis of type acceptance in New Zealand. However, as the certification basis are equivalent and the type designs have been harmonised, in accordance with NZCAR §21.503(a) Supplemental Type Certificates issued by the FAA supplemental to Type Certificate R00001RC are deemed to be acceptable technical data in New Zealand.

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) ICAO Type certificate:

Transport Canada Type Certificate Number H-103

TC Type Certificate Data Sheet number H-103 at Issue 10 dated Nov 30, 2006
– Model 427 approved November 19, 1999

(2) Airworthiness design requirements:

(i) *Airworthiness Design Standards:*

The certification basis of the Model 427 is Transport Canada Airworthiness Manual (AWM) Chapter 527 including change 527-3 effective January 3, 1994, plus some additional FAR 27 amendments adopted by reference, as noted on the TCDS. (This is equivalent to FAR Part 27, including amendment 27-32 effective June 11, 1996, plus some additional AWM requirements.) Specified paragraphs of AWM Chapter 529 change 529-4 effective June 1, 2002 were used for showing compliance with engine isolation. (The FAR equivalent is defined in FAA AC27-1A Section 780.) The certification basis for Category A was the same plus AWM 527 Change 4 Appendix C. (This is equivalent to FAR 27 Appendix C at Amendment 27-33.)

This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41, as FAR Part 27 is the basic standard for Normal Category Rotorcraft called up under Part 21 Appendix C. There are no non-compliances and no additional special conditions have been prescribed by the Director under §21.23.

(ii) *Special Conditions:*

SCA 97-01 – HIRF – Each electrical and electronic system that performs critical functions must be designed and installed to ensure operation and capabilities will not be adversely affected by exposure to external high-intensity radiated fields.

SCA 91-11 – Lightning Protection Indirect Effect – Each critical electrical and electronic system must be designed and installed to ensure operation will not be adversely affected when exposed to lightning, and essential systems must be protected to ensure functions can be recovered in a timely manner after exposure.

SCA 99-02 – 30-Second OEI Limits; Limit Over-ride Feature – Specifies the criteria under which the capability to over-ride the means for automatic limiting and exceed rated 30-second OEI (One Engine Inoperative) limits are acceptable.

(iii) *Equivalent Level of Safety Findings:*

AWM §527.175(c) Static Longitudinal Stability in Autorotation (Transport Canada Issue Paper 427/FT-4) – Static longitudinal stability must be shown in autorotation at aircraft speeds from 0.5 minimum rate-of-descent to 1.1 V_{NE} (power off). There were some combinations of gross weight, centre of gravity and density altitude where the control position versus speed curve was not positive. This was accepted after certification flight testing showed that control of the 427 throughout the allowable speed range for autorotation was acceptable without requiring exceptional pilot skill, alertness or strength, in conjunction with some other mitigating handling factors.

AWM §527.307(b), §527.723, .725, .727 Landing Gear Limit Drop Test (Transport Canada Issue Paper 427/S-6) – This allows for analytical methods as an acceptable means of compliance for skid type landing gear in lieu of drop tests, as was granted to previous Bell models.

AWM §529.1191(a) Designated Fire Zones (Transport Canada Issue Paper 427/P-1) – The engines are not enclosed by fireproof firewalls. The gearbox is located in the transmission compartment and is separated from the compressor by the inlet area, which is isolated by fireproof means. Transport Canada allowed the compressor to be designated a fire zone, and the shrouded accessory section a “flammable fluid leakage zone”, in accordance with the provisions of FAR 29.

(iv) *Airworthiness Limitations:*

Bell Model 427 Helicopter Maintenance Manual – Chapter 4

(3) Aircraft Noise and Engine Emission Standards:

(i) *Environmental Standard:*

The Model 427 has been tested under the noise requirements of ICAO Annex 16, Volume 1 Third Edition, Amendment 6; and FAR Part 36 Appendix H, including Amendment 36-22.

Although helicopters are exempted under FAR Part 34 the Model 427 has been certificated under AWM §516.105 Vented Fuel Standards.

(ii) *Compliance Listing:*

BHT Report No. 427-099-011 – Noise Certification Compliance of the Model 427
Volume One – Summary
Volume Two – 6000 Pound Internal Gross Weight Configuration
Volume Three – 6350 Pound Internal Gross Weight Configuration
Volume Four – 6550 Pound Internal Gross Weight Configuration

Flight Manual BHT-427-FM-2 Section 4-10 Noise Levels and 427-FMS-23:

Flight Condition:	Takeoff:	Flyover:	Approach:
At 6350 lb. MAUW:	88.5	89.0	91.2 EPNdB
At 6550 lb. MAUW:	88.8	89.0	91.3 EPNdB

(4) Certification Compliance Listing:

BHT Report No. 427-099-002 – Model 427 General Compliance Program – Rev.B

BHT Report No. 427-099-033 – Model 427 Certification Plan for Internal Gross Weight Increase to 6350 lbs, Altitude Increase up to 10,000 ft HP and -30°C Minimum Operating Temperature – Rev.F dated 00-07-10

BHT Report No. 427-099-119 – Model 427 Certification Plan for Gross Weight Increase to 6650 lbs – Rev.B dated 04-03-05

BHT Report No. 427-099-135 – Model 427 Certification Plan for Category A

(5) Flight Manual:

Canadian Department of Transport-Approved Rotorcraft Flight Manual Bell Model 427 – S/N 56025 and subsequent. S/N 56001 through 56024 when Increased Gross Weight Kit 427-704-002 and Airframe Fuel Shut-off Valve Kit 427-706-018 have both been incorporated. S/N 58001 and subsequent.

Document BHT-427-FM-2 – CAA Accepted as AIR 3186

(6) Operating Data for Aircraft:

(i) *Maintenance Manual:*

Bell Model 427 Maintenance Manual – Document BHT-427-MM

Bell 427 Component Repair and Overhaul Manual – Document BHT-427-CR&O

Bell Model 427 Installation Instructions – BHT-427-II

427 Component Repair and Overhaul Manual Vendor Data – BHT-427-CR&O-V

Structural Repair Manual for all Bell Commercial Products – BHT-ALL-SRM

Standard Practices Manual for all Bell Commercial Products – BHT-ALL-SPM

Electrical Standard Practices Manual for Commercial Products – BHT-ELEC-SPM

(ii) *Current service Information:*

Bell Model 427 Technical Bulletins – BHT-427-TB

Bell Model 427 Alert Service Bulletins – BHT-427-ASB

Bell Model 427 Operations Safety Notices – BHT-427-OSN

Bell Model 427 Information letters – BHT-427-IL

(iii) *Illustrated Parts Catalogue:*

Bell Model 427 Illustrated Parts Breakdown Manual – Document BHT-427-IPB-1

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

Bell provides on-line document access at their website www.bellhelicopter.net

(8) Other information:

Bell 427 VFR Product Specifications – January 2006

Rogerson Kratos – Pilot's Handbook for Integrated Instrument Display System (IIDS) used on Bell Model 427 Rotorcraft – BHT P/N 427-375-001-105/7

Bell Model 427 Rotorcraft Manufacturer's Data – Document BHT-427-MD-02

BHT Report No. 427-099-031 – Electrical Load Analysis for Model 427 Production Configurations – Rev.K dated 07-01-29

Report No. 427-099-053 – EMC Evaluation Test Procedures for Non-Qualified Electrical/Electronic Equipment Installed on Model 427 Helicopter with the Pratt & Whitney Canada Electronic Engine Control as a Victim – Rev.D dated 00-10-18

5. Additional New Zealand Requirements

Compliance with the retrospective airworthiness requirements of NZCAR Part 26 has been assessed as they are a prerequisite for the grant of an airworthiness 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 Appdx. B # .35	Not Applicable – Agricultural Aircraft only

Appendix E – Helicopters

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
E.1	Doors/Exits – (1) Operable inside and out, (2) unobstructed; (3) prevent inadvertent operation, indicates if not closed	Compliance with FAR Part 27, at Revision 32 dated 11 June 1996, which includes seat dynamic testing and cabin and fuel tank crashworthiness provisions, is considered to provide an Equivalent Level of Safety to these exit requirements.
E.2.1	Emergency Exit Marking – Identity; Location; operation	FAR §27.807(b)(3)

Compliance with the following additional NZ 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	Seating and Restraints – Safety belt/Shoulder Harness	FAR § 27.785
91.507	Pax Information Signs – Smoking, safety belts fastened	Not Applicable – Less than 10 passenger seats
91.509 Min. VFR	(1) ASI (2) Machmeter (3) Altimeter (4) Magnetic Compass (5) Fuel Contents (6) Engine RPM (7) Oil Pressure	FAR § 27.1303(a) N/A – No Mach limitations FAR § 27.1303(b) FAR § 27.1303(c) FAR § 27.1305(d) FAR § 27.1305(k) FAR § 27.1305(h)
91.511	Night VFR Instruments and Equipment	Fitted as Standard – See BHT-427-MD Section 1-26
91.513	VFR Communication Equipment	<i>Operational Requirement – Compliance as applicable</i>
91.517	IFR Instruments and Equipment	Not Applicable – Not approved for IFR operations
91.519	IFR Communication and Navigation Equipment	Not Applicable – Not approved for IFR operations
91.523	Emergency Equipment: (a) More Than 9 pax - First Aid Kits per Table 7 - Fire Extinguishers per Table 8 (b) More than 20 pax - Axe readily accessible 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 C126 406 MHz after 22/11/2007	<i>Operational Requirement – Compliance as applicable</i>
91.531	Oxygen Indicators – Volume/Pressure/Delivery	N/A – Maximum operating pressure altitude is 10,000 feet (See Flight Manual Limitations BHT-427-FM-2 Section 1-8)
91.533	Oxygen for Non-pressurised Aircraft	Not Applicable
91.541	SSR Transponder and Altitude Reporting Equipment	<i>Operational Requirement – Compliance as applicable</i>
91.543	Altitude Alerting Device – Turbojet or Turbofan	Not Applicable – Not turbojet or turbofan.
91.545	Assigned Altitude Indicator	Not Applicable – Not approved for IFR operations
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 and Restraints – Shoulder harness flight-crew seats	FAR §27.785
135.357	Additional Instruments (Powerplant and Propeller)	FAR §27.1305
135.359	Night Flight	<i>Operational Requirement – Compliance as applicable</i>
	Landing light, Pax compartment	
135.361	IFR Operations	Not Applicable – Not approved for IFR operations
135.363	Emergency Equipment (Part 91.523 (a) and (b))	<i>Operational Requirement – Compliance as applicable</i>
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

Attachments

The following documents form attachments to this report:

Photographs first-of-type example Bell 427 serial number 56017 ZK-HVN

Three-view drawing Bell Helicopter Textron Canada Model 427

Copy of Transport Canada Type Certificate Data Sheet Number H-103

Sign off

.....
David Gill
Team Leader Airworthiness

.....
Checked – Peter Gill
Airworthiness Engineer