
Type Acceptance Report

TAR 13/21B/2 – Revision 2

WILLIAMS INTERNATIONAL FJ44 Series

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
1. INTRODUCTION	1
2. PRODUCT CERTIFICATION DETAILS	2
3. APPLICATION DETAILS AND BACKGROUND INFORMATION	3
4. NZCAR §21.43 DATA REQUIREMENTS	4
ATTACHMENTS	6
APPENDIX 1	7

Executive Summary

New Zealand Type Acceptance has been granted to the Williams International FJ44 Series turbojet engines based on validation of FAA Type Certificate number E3GL. There are no special requirements for import.

Applicability is limited to the Models and/or serial numbers detailed in Section 2, which are now eligible for installation on a NZ-registered aircraft. 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(b).

NOTE: The information in this report is correct as at the date of issue. The report is 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 State-of-Design Type Certificate Data Sheet.

1. Introduction

This report details the basis on which Type Acceptance Certificate No.13/21B/2 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.

The report also notes the status of all models included under the State-of-Design type certificate which have been granted type acceptance in New Zealand. The history of the FJ44 Series type acceptance in New Zealand under FAA type certificate E3GL is listed in Appendix 1, and includes models type accepted as part of the aircraft under Part 21B prior to Amendment 6.

2. Product Certification Details

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

Manufacturer: Williams International Co., L.L.C.
 Type Certificate: E3GL
 Issued by: Federal Aviation Administration
 Production Approval: FAA PC 334CE

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

(i) Model: FJ44-1A Series

<i>Thrust Rating:</i>	FJ44-1A	FJ44-1AP
Maximum Continuous	1900 lb.	1950 lb.
Take-off (5 minutes)	1900 lb.	1965 lb.

(i) Model: FJ44-2A Series

<i>Thrust Rating:</i>	FJ44-2A	FJ44-2C
Maximum Continuous	2300 lb.	2400 lb.
Take-off (5 minutes)	2300 lb.	2400 lb.

(ii) Model: FJ44-3A Series

<i>Thrust Rating:</i>	FJ44-3A	FJ44-3A-24	FJ44-3AP
Maximum Continuous	2820 lb.	2490 lb.	3052 lb.
Take-off (5 minutes)	2820 lb.	2490 lb.	3052 lb.

(iii) Model: FJ44-4A Series

<i>Thrust Rating:</i>	FJ44-4A	FJ44-4A-QPM
Maximum Continuous	3443 lb.	3433 lb.
Take-off (5 minutes)	3621 lb.	3616 lb.

3. Application Details and Background Information

There have been examples of the FJ44 engine in New Zealand prior to Part 21B at Amendment 6, when there was no provision for separate type acceptance of products, and engines were included as part of an aircraft validation. The FJ44-1A was type accepted with the Cessna 525 (CJ1), while the FJ44-3A was included as part of the Cessna 525B (CJ3) type acceptance. The first application for separate type acceptance was for the FJ44-4A, from the manufacturer dated 31 July 2012. The FJ44 family is a two-spool co-rotating turbofan with a full-length bypass duct and mixed exhaust.

Type Acceptance Certificate Number 13/21B/2 was granted on 12 October 2012 to the Model FJ44-4A turbojet based on validation of FAA Type Certificate number E3GL. There are no special requirements for import into New Zealand.

The FJ44 was developed in 1985 as an all new class of light turbofan engine, initially in partnership with Rolls Royce PLC, and was first flown on the Scaled Composites Triumph concept aircraft. The first commercial application was the FJ44-1A on the Cessna 525 Citation Jet. The FJ44 consists of a single-stage fan, an axial low-pressure compressor, a single-stage centrifugal high-pressure compressor, a single-stage high-pressure turbine and a two-stage low-pressure turbine. Later versions are equipped with a full authority digital electronic control.

The FJ44-2A is an increased thrust (2300 lb) version with a larger wide-chord fan and two additional IP compressor stages, and is used on the Beechcraft Premier and SJ30 business jets, and the CJ2 aircraft in FJ44-2C form with an Integrated FCU. The FJ44-3A used on the CJ3 has a further thrust increase (2820 lb) by the use of aerodynamic changes which have improved core airflow. To achieve the required thrust (3621 lb) on the FJ44-4A for the CJ4 the FJ44-3A was effectively scaled-up by 10%.

This report was raised to Revision 1 to add the FJ44-3AP version of the engine, fitted to the Nextant “400XT” conversion of the Beech 400A business jet. The applicant was the engine manufacturer, and Type Acceptance was granted on 27 February 2015. The FJ44-3AP incorporates a new IP compressor rotor and corresponding stators (3 stages) to achieve a higher thrust rating (3052 lb) over the FJ44-3A. The P/N 111000-202 version which is fitted to the Nextant 400XT updates the FJ44-3AP base engine, P/N 111000, with the incorporation of an HP Bleed and Precooler System.

Revision 2 adds the FJ44-4A-QPM version used on the Pilatus PC-24 executive jet. The application was from the engine manufacturer, and Type Acceptance was granted on 20 December 2021. The “Quiet Power Mode” version is the same as the base model except for changes to suit the aircraft requirements. The main one is a new feature from Williams that enables the engine to reduce ground idle while still producing sufficient electrical power to power cabin systems to remove the need for an APU. Other physical changes include: heated anti-ice engine inlet; middle and aft nacelle bulkheads; HP bleed air pre-cooler assembly; EXACT™ exhaust (a patented passive-thrust-vectoring exhaust nozzle technology); low oil level switch with integral oil level sight glass; and two electrical oil debris sensors. There were also some additional FADEC software functions, including advanced health-monitoring.

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 E3GL

FAA Type Certificate Data Sheet number E3GL at Rev 25 dated April 21, 2021

- Model FJ44-1A approved March 26, 1992
- Model FJ44-2A approved July 7, 1997
- Model FJ44-2C approved April 25, 2000
- Model FJ44-3A approved July 30, 2004
- Model FJ44-1AP approved June 1, 2005
- Model FJ44-3A-24 approved September 9, 2005
- Model FJ44-4A approved February 2, 2010
- Model FJ44-3AP approved May 12, 2011
- Model FJ44-4A-QPM approved June 8, 2017

(2) Airworthiness design requirements:

(i) *Airworthiness Design Standards:*

The certification basis of the Williams International FJ44-1A twin-spool turbofan is 14 CFR Part 33 effective February 1, 1965, including Amendments 33-1 through 33-14, plus 14 CFR Part 34 effective September 10, 1990. This was updated to later Amendments of Part 33 for subsequent versions of the engine up to Amendments 32 and 33 for the FJ44-4A-QPM. (See the TCDS for full details.) Special Installation Requirements are also listed on the TCDS. (See Note 11.)

This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41 and Advisory Circular 21-1A, because FAR 33 is the basic standard for aircraft engines called up under Part 21 Appendix C.

(ii) *Special Conditions:*

Nil

(iii) *Equivalent Level of Safety Findings:*

FJ44-1AP (P/N 72100-200), FJ44-3A, and FJ44-3A-24:

FAR §33.28(b) and 33.68 Electrical and Electronic Engine Control Systems – The FAA accepted specified electrical power and air data reliability limitations imposed in the engine Installation Instructions which would provide sufficient assurance against unacceptable loss of thrust or prevention of continued safe operation due to failure of the aircraft-supplied power.

FJ44-4A and FJ44-4A-QPM:

FAR §33.83 Vibration Test – FAA Memo 8040-ELOS-09-NE03 – Compliance was shown by a combination of vibratory test surveys on hardware, tests on similar engines and analysis, in lieu of a complete vibration survey. This was accepted on the basis of similarity of component vibratory and steady stresses, engine cycle and operating conditions, and material high-cycle fatigue strength, between the tested engines. In addition any differences were adequately reconciled.

(iv) *Exemptions:*
Nil

(v) *Airworthiness Limitations:*
See the respective FJ44 Maintenance Manual Section 05-10-00 – Airworthiness Limitations – Approval

(3) Aircraft Noise and Engine Emission Standards:

(i) *Environmental Standard:*
Most of FJ44 series have been shown to meet the fuel venting emission provisions of FAR Part 34 at Amendment 6, effective March 5, 2018, and the smoke number (SN) emission standards of FAR Part 87 effective July 18, 2012.

(ii) *Compliance Listing:*
New Zealand CAA Validation of the FJ44-4A-QPM Engine – FJ44-4A Engine Emissions Summary

(4) Certification Compliance Listing:

Williams International Compliance Report CR33.3.1A – FJ44-1A Engine Compliance Summary Report – Project Number CJ3159GL – 26 March 1992

Williams International Compliance Report 2ACR33.3.1 – Appendix A – FJ44-2A Engine Compliance Checklist – 26 June 1997

Williams International Compliance Report 2CCR33.3.1 – Appendix A – FJ44-2C Engine Compliance Checklist – 24 April 2000

Williams International 14 CFR Part 33 Compliance Report P/N: 73594A – FJ44-3A Engine Compliance Summary – dated August 10, 2004

Williams International – 14 CFR Part 33 Compliance Report 111528 Revision B – FJ44-4A Engine – Compliance Summary – January 18, 2011

Williams International – 14 CFR Part 33 Compliance Report 111546-202 Rev A – FJ44-3AP Engine P/N 111000-202 Compliance Summary Report – 12-05-11

Williams International – FJ44-4A-QPM PN 73200-201 Compliance Checklist

(5) Flight Manual: N/A

(6) Operating Data for Engine:

(i) *Maintenance Manual:*

Model	Engine Assembly Part Number:	Line Maintenance Manual:	Line Maintenance Manual Elite:	Engine Inspection Manual:
FJ44-1A	45700-104	110506	2012673	50774
FJ44-1AP	72100-200	120645	2012674	73569
	72100-201	120645	2012674	73569
FJ44-2A	56000	56210	110507	2012676
	56000-103	56210	110507	2012676
	56000-104	56210	110507	2012676
FJ44-2C	60500	64135	110508	2012677
	60500-103	64135	110508	2012677
FJ44-3A	67000-200	68585	120644	2012678
	67000-202	68585-202	-	2012678
FJ44-3A-24	75000-200	68585	120644	2012678
FJ44-3AP	111000	111339	-	2012679
	111000-202	111339-202	123809	2012679
FJ44-4A	73200-200	110990	-	2012681
FJ44-4A-QPM	73200-201	110990-201	-	2012681

(ii) *Current service Information:*

Williams International FJ44 Service Bulletins

(iii) *Illustrated Parts Catalogue:*

Williams International FJ44-1A Illustrated Parts Catalog – WI P/N 50775

Williams International FJ44-1AP Illustrated Parts Catalog – WI P/N 73597

Williams International FJ44-2A Illustrated Parts Catalog – WI P/N 59875

Williams International FJ44-2C Illustrated Parts Catalog – WI P/N 64566

Williams International FJ44-3A Illustrated Parts Catalog – WI P/N 73923

Williams International FJ44-3AP Illustrated Parts Catalog – WI P/N 111342

Williams International FJ44-4A Illustrated Parts Catalog – WI P/N 110993

Williams International FJ44-4A-QPM IPC – WI P/N 110993-201

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

CAA 2171 form – Williams International Co. DER dated 27.08.02 – FJ44-1A

CAA 2171 form from Williams International Co. DER (undated) – FJ44-3A

CAA 2171 form – Manager ODA, Williams International LLC dated 24/2/2015

Access to publications now provided through the website Customer Portal:

<https://connect.williams-int.com/customers20/login.aspx>

(8) Other information:

Williams International – Evolution of the FJ44 Turbofan Engine – 8 April 2001

Model:	Engine Assembly Part No:	Installation Instructions:	Operating Instructions:	Airframe Application:
FJ44-1A	45700-104	50771	50773	Cessna 525
FJ44-1AP	72100-200 72100-201	75274 75274-201	73568 73568	Cessna 525 CJ+ Cessna 525 M2
FJ44-2A	56000 56000-103 56000-104	56208 56208 56208	56209 56209 56209	Raytheon 390 Sino-Swearingen SJ30 Sierra C5xx STC
FJ44-2C	60500 60500-103	63784 63784	63785 63785	Cessna 525A Learjet STC proposal
FJ44-3A	67000-200 67000-202	68583 68583-202	68584 68584-202	Cessna 525B Clifford C550 STC
FJ44-3A-24	75000-200	68583	68584	Cessna 525A CJ2+
FJ44-3AP	111000 111000-202	111366 111366-202	-- --	Base model Nextant B400 STC
FJ44-4A	73200-200	110675	--	Cessna 525C
FJ44-4A-QPM	73200-201	110675-201	--	Pilatus PC-24

Attachments

The following documents form attachments to this report:

Copy of FAA Type Certificate Data Sheet Number E3GL

Sign off



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David Gill
Team Leader Aircraft Inspection



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Checked – Kavita Vanmari
Certification Engineer

Appendix 1

List of Type Accepted Variants:

<i>Model:</i>	<i>Applicant:</i>	<i>CAA Work Request:</i>	<i>Date Granted:</i>
FJ44-1A	Cessna Aircraft Company	3/21B/5	28 February 2003
FJ44-3A	Cessna Aircraft Company	5/21B/18	27 May 2005
FJ44-4A	Williams International Co, L.L.C.	13/21B/2	12 October 2012
FJ44-3AP	Williams International Co, L.L.C.	15/21B/17	27 February 2015
FJ44-1AP	Textron Aviation Inc.	17/21B/23	15 August 2017
FJ44-2C	Textron Aviation Inc.	17/21B/23	15 August 2017
FJ44-3A-24	Textron Aviation Inc.	17/21B/23	15 August 2017
FJ44-2A	Williams International Co, L.L.C.	22/21B/7	20 December 2021
FJ44-4A-QPM	Williams International Co, L.L.C.	22/21B/7	20 December 2021