

---

# **Type Acceptance Report**

**TAR 17/21B/13 – Revision 1**

**IAE PW1100G-JM/PW1400G-JM Series**



## TABLE OF CONTENTS

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



## Executive Summary

New Zealand Type Acceptance has been granted to the International Aero Engines LLC PW1100G-JM and PW1400G-JM Series based on validation of FAA Type Certificate number E00087EN. There are no special requirements for import.

Applicability is limited to the Models and/or serial numbers detailed in Appendix 1, 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 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. 17/21B/13 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, which are listed in Section 2. Appendix 1 lists the New Zealand type acceptance history.

## 2. Product Certification Details

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

TC Holder: International Aero Engines, LLC

Type Certificate: E00087EN

Issued by: Federal Aviation Administration

Production Approval: FAA PC114

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

- (i) **Models:** PW1133G-JM, PW1133GA-JM, PW1130G-JM  
PW1127G-JM, PW1127GA-JM, PW1127G1-JM  
PW1124G-JM, PW1124G1-JM, PW1122G-JM  
PW1431G-JM

### 3. Application Details and Background Information

The application for New Zealand type acceptance of the PW1100G-JM and PW1400G-JM Series was from the type certificate holder, International Aero Engines LLC, dated 6 December 2016. The PW1000G Series is an all-new design high bypass ratio axial-flow twin-spool turbofan with FADEC control incorporating the novel technology of a gear-driven main fan, and is available in three families with thrust ratings of 17,000 lb., 25,000 lb. and 33,000 lb. As part of the type acceptance exercise a team of certification specialists from the CAA Aircraft Certification Unit visited Pratt and Whitney in East Hartford for a validation/familiarisation review.

Type Acceptance Certificate Number 17/21B/13 was granted on 19 October 2017 to the PW1100G and PW1400G Series based on validation of FAA Type Certificate E00087EN. Specific applicability is limited to the coverage provided by the operating documentation supplied. There are no special requirements for import into New Zealand.

This report was raised to Revision 1 to add the major engineering change 15CZ304 for the Full Authority Digital Electronic Control (FADEC) software FCS5.0 for the PW1100G-JM series engine models by service bulletin PW1000G-C-73-00-0037-00A-930A-D. Application was from the manufacturer dated 5 November 2020. Type Acceptance was granted on 10 February 2021.

The PW1000G Series are all similar in basic engine architecture, and comprise three basic thrust classes. The low-pressure spool consists of a three-stage low-pressure turbine that directly drives a three-stage low-pressure compressor, and a single stage high bypass ratio fan (12:1) through a fan drive gear speed reduction system for improved cycle efficiency. The high-pressure compressor has eight axial stages driven by a two-stage cooled high-pressure turbine. The split-dome combustor incorporates proprietary TALON X technology for low emissions. The new feature of the PW1000G Series engine is a fan drive gear system (FDGS). The fan case is 100% composite construction, and the fan blade is a hollow, bonded, aluminium material with a titanium leading edge sheath.

Type Certificate E00087EN covers the PW1000G high thrust range family (33k) with an 81 inch fan. The PW1100G-JM Series was developed for the Airbus A320 NEO airliner. The basic models are the PW1133G-JM for the A321-271n, the PW1127G-JM for the A320-271n and the PW1124G-JM for the A319-171n. The other models are reduced thrust, alternate climb thrust or hot and high thrust versions. The PW1431G-JM model has been developed for the Irkut MC21-300 airliner. Differences between the PW1100G-JM Series and the PW1400G-JM Series relate to airframe installation differences. Within each Series the different models incorporate the same turbomachinery (identical Bill of Materials). Thrust ratings for each model are achieved by selectable thrust setting logic in the FADEC software, input through the Data Storage Unit (DSU) plug.

#### 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 E00087EN

FAA Type Certificate Data Sheet no. E00087EN at revision 6 dated May 6, 2019

- Model PW1133G-JM approved December 19, 2014
- Models PW1133GA-JM, PW1130G-JM approved October 23, 2015
- Models PW1127G-JM, PW1127GA-JM approved October 23, 2015
- Models PW1127G1-JM, PW1124G-JM approved October 23, 2015
- Models PW1124G1-JM, PW1122G-JM approved October 23, 2015
- Model PW1431G-JM approved May 6, 2016

(2) Airworthiness design requirements:

(i) *Airworthiness Design Standards:*

The certification basis of the PW1100G-JM and PW1400G-JM Series geared turbofan engine is 14 CFR Part 33, effective February 1, 1965, including Amendments 33-1 through 33-32. Three ELOS were granted, which have been reviewed and accepted by the CAA. A fourth ELOS was granted post-certification due to the software update FCS5.0. This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41 and Advisory Circular 21-1A, as 14 CFR Part 33 (FAR 33) is the basic standard for aircraft engines 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:*

Nil

(iii) *Equivalent Level of Safety Findings:*

TC3289EN-E-P-8-R1 14 CFR §33.76(c)(7)(i) Bird Ingestion: Requires ingestion of a flock of birds within 1 second. During the test one of seven birds failed to fire. The test was restarted and the final bird ingested, with the 20-minute follow on sequence completed. IAE showed by testing and analysis that the birds impacts act individually, and the re-test would not change the test results.

TC3289EN-E-P-5-R1 14 CFR §33.77(c) Foreign Object Ingestion-Ice: This requires that ingestion of an ice slab does not cause sustained power or thrust loss, or require engine shutdown. Compliance is shown by test under specific conditions. IAE elected to show compliance to a later Amendment status of the Rule, which allows validated analysis. The analysis was also considered conservative because of a number of factors used, including slab size, thickness and orientation.

TC3289EN-E-P-6-R1 14 CFR §33.78(a)(1) Rain and Hail Ingestion: Ingestion of large hailstones may not cause unacceptable mechanical damage, power loss or shutdown. Compliance by analysis, similarity and static rig impact testing to predict fan blade damage



was accepted in lieu of an engine test. This included assessment of all susceptible components and testing of critical areas.

TC3289EN-E-P-9 14 CFR §33.27(c) & (e) Turbine, compressor, fan, and turbosupercharger rotor overspeed: This exemption was granted to allow the engine shaft shear overspeed protection logic to be disabled for a “common mode” threat since the probability of a shear overspeed event is less than a dual engine shutdown due to the shaft shear logic activation. The system safety demonstrated that the implementation of an engine shear logic interlock design feature reduced the probability of a catastrophic aircraft event (dual engine shutdown) for a common mode threat. Engine/aircraft dispatch with the interlock activated is prohibited.

*(iv) Airworthiness Limitations:*

See PW1100G-JM Airworthiness Limitations Manual P/N 5316993

See PW1400G-JM Airworthiness Limitations Manual Report PWA-9913

(3) Aircraft Noise and Engine Emission Standards:

*(i) Environmental Standard:*

The PW1100G-JM and PW1400G-JM Series has been certificated for fuel venting and exhaust emissions under FAR Part 34, including Amendments 34-1 through 34-5a effective Oct. 23, 2013, and FAR Part 87 effective Oct. 31, 2012. (CAEP/8)

*(ii) Compliance Listing:*

Report PWA-9967 – International Aero Engines, LLC PW1100G-JM Turbofan Engine Certification Fuel Venting Emissions Analysis Report – May 2014

Report PWA-9968 – International Aero Engines, LLC PW1100G-JM Turbofan Engine Certification Smoke & Exhaust Engine Emissions Test Report – May 2014

Report PWA-10298 – International Aero Engines, LLC PW1400G-JM Turbofan Engine Certification Smoke & Exhaust Engine Emissions Test Report – Feb 2016

(4) Certification Compliance Listing:

Report PWA-9845-01 – IAE LLC PW1100G-JM Turbofan Engine Certification Summary of Compliance – Revision 1 Issue October 2015

Report PWA-10101 – IAE LLC PW1400G-JM Turbofan Engine Certification Summary of Compliance – Original Issue April 2016

Report PWA-12266 – Engineering change 15CZ304 substantiation summary FCS5.0 software revision – Initial release April 2019

(5) Flight Manual: Not Applicable

(6) Operating Data for Engine:

*(i) Maintenance Manual:*

PW1100G-JM Engine Maintenance Manual (EMM) P/N 5316994

PW1100G-JM Engine Manual (EM) P/N 5316992

PW1100G-JM Clean, Inspect and Repair Manual (CIR) P/N 5315653

PW1400G-JM Engine Maintenance Manual (EMM) P/N  
PW1400G-JM Engine Manual (EM) P/N  
PW1400G-JM Clean, Inspect and Repair Manual (CIR) P/N

(ii) *Current service Information:*  
Service Bulletins

(iii) *Illustrated Parts Catalogue:*  
PW1100G-JM Illustrated Parts Document P/N  
PW1400G-JM Illustrated Parts Document P/N

(7) Agreement from manufacturer to supply updates of data in (5), and (6):  
IAE provides CAA access to manuals at [www.fleetcare.pw.utc.com](http://www.fleetcare.pw.utc.com)

(8) Other information:  
PW1100G-JM Series Installation & Operating Manual Report PWA-9851  
PW1400G-JM Series Installation & Operating Manual Report PWA-9914

## Attachments

The following documents form attachments to this report:

Copy of FAA Type Certificate Data Sheet Number E00087EN

## Sign off

  
.....  
Lino Miguel  
Certification Engineer

  
.....  
Checked – Greg Baum  
Team Leader Product Certification

## Appendix 1

### List of Type Accepted Variants:

<i>Model:</i>	<i>Applicant:</i>	<i>CAA Work Request:</i>	<i>Date Granted:</i>
PW1100G-JM Series	IAE LLC	17/21B/13	19 October 2017
PW1400G-JM Series	IAE LLC	17/21B/13	19 October 2017
PW1100G-JM Series*	IAE LLC	21/21B/13	10 February 2021

\*Variant updated with Full Authority Digital Electronic Control (FADEC) Software FCS5.0 certified by FAA.