Type Acceptance Report

TAR 17/21B/29

LYCOMING IO-390 Series

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Executive Summary

New Zealand Type Acceptance has been granted to the Lycoming IO-390 and AEIO-390 Series engines based on validation of FAA Type Certificate number E00006NY. 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(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.17/21B/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 product in New Zealand; and

(b) Identify any special conditions for import applicable to any model(s) covered by the Type Acceptance Certificate.

2. Product Certification Details

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

Manufacturer:	Lycoming Engines
Type Certificate:	E00006NY
Issued by:	Federal Aviation Administration
Production Approval:	FAA PC 3

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

(i) **Models:** IO-390-A1A6, -A3A6, -A1B6, -A3B6

(ii) **Models:** AEIO-390-A1A6, -A3A6, -A1B6, -A3B6

(iii) **Models:** IO-390-C1A6, -C3A6, -C1B6, -C3B6

3. Application Details and Background Information

The application for New Zealand type acceptance of the IO-390-C Series was from the manufacturer, dated 15 June 2017. The Lycoming IO-390 is a four cylinder air-cooled, horizontally opposed, direct drive, fuel injected, tuned-induction engine having oil jets for internal piston cooling, and provisions for a single action controllable pitch propeller.

Type Acceptance Certificate Number 17/21B/29 was granted on 3 October 2017 to the Lycoming IO-390 and AEIO-390 Series engines based on validation of FAA Type Certificate E00006NY. There are no special requirements for import into New Zealand.

The IO-390-A was an all-new larger displacement 210 hp engine originally developed for the kitbuilt market. It is basically the IO-360 crankcase modified to be compatible with the larger bore cylinders and larger capacity piston oil squirts from the IO-580-B1A. The cylinders are similar to the IO-580 except for larger intake valves and seats. Following type certification it has been approved as a retrofit for the Mooney M20 and Commander 112 by STC, and in production for the American Champion 8KCBC. The AEIO models have an inverted oil system for use on aerobatic aircraft. The 215 hp IO-390-C series was developed for the Cirrus SR20 using a lightweight oil sump, cold air induction housing, tuned intake pipes and an RSA-10 fuel injector.

The main difference between the engine sub-variants has to do with the location of the optional propeller governor. On the IO-390-CxA6 it is installed on the rear of the engine whereas on the IO-390-CxB6 it is installed on the front of the crankcase. The number after the engine suffix letter indicates a different propeller flange bushing index.

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:

FAA Type Certificate Number E00006NY

FAA Type Certificate Data Sheet no.E00006NY at Revision 6 dated Jan 25, 2017
- Model IO-390-A1A6 approved March 30, 2009
- Model IO-390-A3A6 approved August 27, 2009
- Models IO-390-A1B6 and -A3B6 approved January 21, 2010
- Models AEIO-390-A1A6 and -A3A6 approved April 5, 2012
- Models AEIO-390-A1B6 and -A3B6 approved April 5, 2012
- Models IO-390-C1A6 and -C3A6 approved January 25, 2017
- Models IO-390-C1B6 and -C3B6 approved January 25, 2017

(2) Airworthiness design requirements:

(i) Airworthiness Design Standards:
The certification basis of the IO-390-A and AEIO-390-A Series is FAR Part 33 effective February 1, 1965, as amended by 33-1 through 33-24. For the IO-390-C Series this was updated to FAR 33 as amended by 33-1 through 33-34, except that §33.16 was replaced by compliance with CAR §13.16(c). This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41 and Advisory Circular 21-1A, as 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:
Nil

(iv) Airworthiness Limitations:
See the Airworthiness Limitations Section of each Maintenance Manual

(3) Environmental Certification:

None (not required for piston engines)

(4) Certification Compliance Listing:

Compliance Check List – IO-390-C (-X255) – FAA Project AT08277NY-E

Issue Paper IP-G-1 – Certification Basis of Lycoming Engines IO-360-N1A – With the update of the certification basis from CAR 13 to FAR 33 an issue arose over the requirement for each engine rating to be the lowest that all engines of that type may be expected to be produced. i.e. meet the minimum power rating specified on the TCDS. (Lycoming uses a tolerance of -2% to +5%, established from years of experience.) Lycoming justified continued use of the production variation on the basis of service experience, with no documented incidents or accidents attributable to the less than 100% variance. The FAA accepted this methodology and allowed it for other engine models.

(5) Flight Manual:

Not Applicable

(6) Operating Data for Engine:

(i) Maintenance Manual:

IO-390-A Series Engine Installation and Operation Manual – Lycoming Part Number 60297-34

AEIO-390-A Series Engine Installation and Operation Manual – Lycoming Part Number 60297-42

IO-390-C Series Engine Installation and Operation Manual – Lycoming Part Number IOM-IO-390-C Series

IO-390-C Series Engine Maintenance Manual (Principal Manual) – Document Part Number MM-IO-390-C Series

IO-390-C Series Engine Overhaul Manual – P/N OHM-IO-390-C Series

(ii) Current service Information:

Service Letters

Service Bulletins

Service Instructions

(iii) Illustrated Parts Catalogue:

IO-390-A Series Engine Illustrated Parts Catalog – Lycoming Document Part Number PC-IO-390-A (supersedes PC-409-1)

AEIO-390-A Series Engine Illustrated Parts Catalog – Lycoming Document Part Number PC-AEIO-390-A (supersedes PC-409-3)

IO-390-C Series Engine Illustrated Parts Catalog – Document P/N PC-IO-390-C

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

CAA 2171 from Lycoming Senior VP & General Manager dated 15-Jun-2017

All Lycoming publications (except the overhaul manual) and revisions are available on the manufacturer's website at:
http://www.lycoming.com/Lycoming/SUPPORT/Technicalpublications.aspx

(8) Other information:

Lycoming Engine Specification N° 2681 dated January 27, 2017, "Detail Specification for Engine, Aircraft, Model IO-390-C1A6, -C3A6"

Lycoming Engine Specification N° 2682 dated January 27, 2017, "Detail Specification for Engine, Aircraft, Model IO-390-C1B6, -C3B6"

Installation Drawing P/N 04D63634

Installation Drawing P/N 04D63637

Attachments

The following documents form attachments to this report:

Copy of FAA Type Certificate Data Sheet Number E00006NY

Sign off

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David Gill	Checked – Craig Bamber
Team Leader Airworthiness	Airworthiness Engineer

Appendix 1

List of Type Accepted Variants:

Model:	*Applicant:*	*CAA Work Request:*	*Date Granted:*
IO-390-A Series	Lycoming Engines	17/21B/29	3 October 2017
AEIO-390-A Series	Lycoming Engines	17/21B/29	3 October 2017
IO-390-C Series	Lycoming Engines	17/21B/29	3 October 2017