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# **Type Acceptance Report**

**TAR 21/21B/8**

**Continental Aerospace Technologies TAE 125 Series**

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## Executive Summary

New Zealand Type Acceptance has been granted to the Continental Aerospace Technologies TAE-125 Series based on validation of EASA Type Certificate number E.055. 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. 21/21B/8 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. Models covered by the type acceptance certificate issued under Part 21B at Amendment 6 or later are listed in Section 2 of this report. Models which were accepted prior to that or under the Transitional Arrangements of Part 21 Appendix A are detailed in Appendix 1 of this report.

## 2. Product Certification Details

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

Manufacturer: Continental Aerospace Technologies GmbH  
Technify Motors GmbH (until 31 July 2019)  
Thielert Aircraft Engines GmbH (until 19 August 2013)

Type Certificate: EASA.E.055  
Issued by: European Aviation Safety Agency

Production Approval: DE.21G.0269

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

- (i) **Model:** TAE 125-01  
Max Take-off Power: 99 kW (135 shp) @ 3900 RPM  
Noise Standard: Not Applicable
- (ii) **Model:** TAE 125-02-99  
Max Take-off Power: 99 kW (135 shp) @ 3900 RPM  
Noise Standard: Not Applicable
- (iii) **Model:** TAE 125-02-114, TAE 125-02-114P  
Max Take-off Power: 114 kW (155 shp) @ 3900 RPM  
Noise Standard: Not Applicable
- (iv) **Model:** TAE 125-02-125  
Max Take-off Power: 125 kW (170 shp) @ 3900 RPM  
Noise Standard: Not Applicable

### 3. Application Details and Background Information

There have been examples of the TAE 125 engine in New Zealand prior to Part 21B at Amendment 6, when there was no provision for separate type acceptance of products, and engines and propellers were included as part of an aircraft validation. The TAE 125-01/02 was originally type accepted as part of the Diamond DA 40 D aircraft. The first application for separate type acceptance was for the Model TAE 125-02-099, and was from the manufacturer dated 1 September 2020.

Type Acceptance Certificate No. 21/21B/8 was granted on 9 November 2020 to the TAE 125-02 Series aircraft engine based on validation of EASA Type Certificate number E.055. Specific applicability is limited to the coverage provided by the operating documentation supplied. There are no special requirements for import into New Zealand.

The TAE 125 engine is an in-line 4-cylinder, four stroke Diesel piston engine with a displacement of 1689 cm<sup>3</sup> (TAE 125-01) and 1991 cm<sup>3</sup> (TAE 125-02 Series), equipped with common rail high pressure direct fuel injection; turbocharger; an integral gearbox with a reduction ratio of 1:1.689; propeller governor; and FADEC ignition control. It is approved to run on jet fuels and diesel fuel meeting EN 590.

The TAE 125-01 was initially developed by Thielert Aircraft Engines and utilised the basic components of the automotive engine used in the Mercedes Benz A Series. The TAE 125-02 was the first development with a larger capacity 2-litre aluminium alloy engine block of Thielert's own design. Power output was kept the same at 135 hp and installation weight was unchanged. Later more powerful versions were developed, the TAE 125-02-114 and -114P (155 hp), and the most recent TAE 125-02-125 (170 hp). The -114P variant is optimised for pusher installations.

The original Thielert marketing name was Centurion 1.7 for the TAE 125-01 and Centurion 2.0 for the TAE 125-02. Under Continental ownership this has changed to the CD-135, CD-155 and CD-170, for the three TAE 125-02 variants.

## 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:

EASA Type Certificate Number E.055

EASA Type Certificate Data Sheet no. E.055 at Issue 13 dated 22 July 2020

- Model TAE 125-01 approved 3 May 2002
- Model TAE 125-02-99 approved 14 August 2006
- Model TAE 125-02-114 approved 6 March 2007
- Model TAE 125-02-114P approved 18 October 2017
- Model TAE 125-02-125 approved 22 July 2020

Supersedes:

JAR-E Engine Data Sheet No. JAA/E/02-030 – Issue 7 dated May 17, 2004

LBA TCDS Nr 4631 Thielert TA 125 – Issue 5 dated 07 May 2004

(2) Airworthiness design requirements:

(i) *Airworthiness Design Standards:*

The certification basis of the TAE 125-01 is JAR-E, Change 10, dated August 15, 1999. This was updated to CS-E 23 September 2003, except CS-E 130 (h), for the TAE 125-02 and all subsequent variants.

This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41, as JAR-E and CS-E are equivalent to FAR 33, which is the basic standard for aircraft engines called up under Part 21 Appendix C and Advisory Circular 21-1. There are no non-compliances and no additional special conditions have been prescribed by the Director under §21.23.

(ii) *Special Conditions:*

*TAE 125-01 and TAE 125-02 Series:*

SC3 and SC1 Failure Analysis: CRI-T6 and T2 – The TAE 125 engine largely comprises a purchased industrial-manufactured basic engine, and will be completed with certain components designed and produced by the TAE company. Under this design concept TAE has no direct access to some data of the baseline hardware design and manufacturing processes, and thus direct compliance with CS-E 70 and CS-E 100 is not possible. Hence, certain compensating factors (see CRI-T1) may provide an equivalent level of safety, and one of these requires that the complete engine, inclusive of the electronic engine control system, must be subjected to an FMEA (Failure Mode and Effect Analysis) in accordance with CS-E 510. Any “major” or “hazardous” engine effect must be identified.

*TAE 125-01:*

SC1 Electronic Engine Control System: CRI T-1 – The TAE 125 achieves redundancy by being assembled from two independent identical units, with dual sensors and actuators where technically feasible and justified by criticality. The engine management system also has an independent safety system. The following considerations had to be considered: Safety objective (equivalent reliability as conventional system); system design (minimise software errors); loss of aircraft supplied data / electrical power; local mechanical events; false air pressure signal; lightning and emf effects; and fault accommodation.

**SC2 Contaminated Fuel: CRI T-2** – The TAE 125 is designed for using both Jet A1 fuel and Diesel fuel. Because of this EASA imposed requirements normally only applicable to turbine engines, to ensure satisfactory operation of the engine and its fuel system with water-saturated and contaminated fuel cooled to the most critical condition for icing. This included consideration of fuel filter clogging and any other susceptible components by ice accretion. The mechanical effect on fuel lubricated parts like pumps and injectors also had to be investigated.

**SC4 Fire Precautions: CRI T-9** – The JAR-E 220 rule is not considered adequate for a diesel engine with a common rail injection system (with high fuel pressure in the range of 1300 bar) using Jet A1 fuel. Therefore EASA required compliance to be shown for the rail with JAR-E 530(b).

**SC5 Certification of Programmed Logic Devices: CRI T-12** – The TAE 125-01 engine is fully controlled by an electronic engine management (FADEC) system using Programmed Logic Devices (PLDs). PLDs often carry out functions otherwise performed by software. In the absence of any JAA policy or guidance this specified requirements based on JAR-E 50 and AMJ 20X-1. With the nature and complexity of systems containing digital logic, PLD should be developed using a structural approach, commensurate with the hazard associated with the failure or malfunction of the system using the device. RTCA DO-254/EUROCAE ED-80 is an acceptable means of compliance.

*TAE 125-02-114P/125:*

**SC2 Engine Flame Out during Flight: CRI T-5** – Service experience has shown that unintended flame-outs can occur more easily in diesel engines after prolonged descent at idle power setting and low ambient temperature (OAT). This may not be immediately detected by the pilot because the engine is still rotating due to the wind milling effect of the propeller in single engine installations. The special condition required: The engine design and operating procedure must provide continued ignition capability under the intended operating conditions of CS-E 40(d), using fuel with the lowest cetane number; and an engine in-flight relight envelope must be specified and proven by test or other evidence, and must include all applicable conditions, e.g. altitude, airspeed, OAT, rotational speed and procedures.

*(iii) Equivalent Level of Safety Findings:*

*TAE 125-01:*

**ESF1 Propeller Functioning Test: CRI T-3** – The TAE 125-01 is designed for operation with a variable pitch, constant speed propeller, but uses a single power lever control with no adjustment of propeller RPM available to the pilot. Because the governor is part of the engine TAE had to show satisfactory functionality over 100 specified forward pitch change cycles.

**ESF2 Engine Test Control Parameters: CRI T-4** – Reference to manifold pressure and mixture settings in JAR-E related to engine testing and engine power control and monitoring are not applicable to the TAE 125-01 engine which is directly controlled through a single lever regulating certain measured variables via the electronic engine management system. Therefore alternative parameters and test points are specified to be representative of actual engine achievable operating conditions.

*TAE 125-01 and TAE 125-02 Series:*

**CS-E 70 and CS-E100: Engine Type Design: CRI T5 (ESF3] and T1**– To achieve and maintain an acceptable level of safety for the in-service fleet requires management based on a precise definition of an engine type design. In the case of the TAE 125 the basic engine is supplied, and TAE has no access to the detailed design and no direct control over the type design standard or changes made in production. TAE therefore proposed a significantly different approach based on some compensating factors. One of these is the FMEA required under SC1, which shall identify all supplied engine parts the failure of which results in Major or Hazardous Engine Effects. These parts shall be analysed to identify the characteristics (e.g. material specification, dimensions etc.) which are critical to their integrity, and which will then be subject to 100% incoming inspection.

*(iv) Airworthiness Limitations:*

See Service Bulletin TM TAE 125-0001 – Subject: Life Time. Because only a few parts can be overhauled the TAE 125-01 has a Time Between Replacement (TBR), while the TAE 125-02 has a Time Between Overhaul (TBO).

(3) Aircraft Noise and Engine Emission Standards:

Not Applicable

(4) Certification Compliance Listing:

Doc. No.: MoC-02-02-99 – Thielert Aircraft Engines Project: TAE 125-02-99 – Means of Compliance List – Issue 2 dated May 30, 2007

Doc. No.: MoC-02-02-114 – Thielert Aircraft Engines Project: TAE 125-02-114 – Means of Compliance List – Issue 1 dated February 21, 2007

(5) Flight Manual: Not Applicable

(6) Operating Data for Engine:

*(i) Maintenance Manual:*

Doc. No. IM-02-01 Thielert TAE 125-01 Installation Manual

Doc. No. OM-02-01 Thielert TAE 125-01 Operation and Maintenance Manual

Doc. No. RM-02-01 Repair Manual

Doc. No. IM-02-02 CD135 / CD 155 Installation Manual

Doc. No. OM-02-02 CD135 / CD155 Operation and Maintenance Manual

Doc. No. RM-02-02 CD135 / CD155 Repair Manual

Doc. No. IM-02-02P CD 155P Installation Manual

Doc. No. OM-02-02P CD155P Operation and Maintenance Manual

Doc. No. IM-02-02B CD170 Installation Manual

Doc. No. OM-02-02B CD170 Operation and Maintenance Manual

TAE Fault Isolation Manual

*(ii) Current service Information:*

TAE GmbH Service Bulletins

*(iii) Illustrated Parts Catalogue:*

Illustrated Parts Catalog Centurion 1.7

Illustrated Parts Catalog Continental Diesel 135

Illustrated Parts Catalog Continental Diesel 155

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

CAA 2171 form from CAT Office of Airworthiness dated 01 Sep 2020

Access to manuals is now provided through the website [www.tmg-service.de](http://www.tmg-service.de)



## Attachments

The following documents form attachments to this report:

Copy of EASA Type Certificate Data Sheet Number EASA.E.055

## Sign off



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David Gill  
Team Leader Aircraft Inspection



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Checked – Tim Dutton  
Flight Test Engineer

## Appendix 1

### List of Type Accepted Variants:

<i>Model:</i>	<i>Applicant:</i>	<i>CAA Work Request:</i>	<i>Date Granted:</i>
TAE 125-01, 02	Diamond Aircraft Industries GmbH	3/21B/34	25 July 2003
TAE 125-02-99	Continental Aerospace Technologies	21/21B/8	9 November 2020
TAE 125-02-114/P	Continental Aerospace Technologies	21/21B/8	9 November 2020
TAE 125-02-125	Continental Aerospace Technologies	21/21B/8	9 November 2020