Type Acceptance Report

TAR 18/21B/38

ENSTROM F-28/280/480 Series

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Executive Summary

New Zealand Type Acceptance has been granted to the Enstrom F-28/280/480 Series helicopters based on validation of FAA Type Certificate number H1CE. There are no special requirements for import.

Applicability is currently limited to the Models and/or serial numbers detailed in Appendix 1, which 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 an assessment of compliance of the basic type design with the operating Rules.) 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. 18/21B/38 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; and

(c) Identify any additional requirements that must be complied with prior to the issue of a NZ Airworthiness Certificate or for any subsequent operations.

The report covers all models included on the State-of-Design type certificate, except for the Model F-28, of which there are none left in service, and the TH-28, which never went into production. Appendix 1 details which models have been type accepted in accordance with the provisions of CAR Part 21B and which models were certificated prior to that under NZCAR Section B.9 and are now type accepted under the transitional arrangements of Part 21 Appendix A(c).

2. Aircraft Certification Details

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

Manufacturer:	Enstrom Helicopter Corporation
Type Certificate:	H1CE
Issued by:	Federal Aviation Administration
Production Approval:	FAA PC319CE (since November 25, 2013); PC319

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

(i) **Models:** 280, F-28A

MCTOW:	2150 lb. [975 kg]
Max. No. of Seats:	3
Noise Standard:	Not Applicable
Engine:	Lycoming HIO-360-C1A or HIO-360-C1B Type Certificate: 1E10 Issued by: Federal Aviation Administration

(ii) **Models:** F-28C, 280C

MCTOW:	2200 lb. [998 kg] 2350 lb. [1066 kg] – per Drawing 28-100005 2600 lb. [1179 kg] – Restricted Category
Max. No. of Seats:	3
Noise Standard:	Not Applicable
Engine:	Lycoming HIO-360-E1AD or HIO-360-E1BD Type Certificate: 1E10 Issued by: Federal Aviation Administration

(iii) **Models:** F-28F, 280F, 280FX

MCTOW:	2350 lb. [1066 kg] 2600 lb. [1179 kg] – Restricted Category 2600 lb. [1179 kg] – per Drawing 28-100015 2600 lb. [1179 kg] – Model 280FX
Max. No. of Seats:	3
Noise Standard:	FAR Part 36
Engine:	Lycoming HIO-360-F1AD Type Certificate: 1E10 Issued by: Federal Aviation Administration

(iv) **Models:** 480, 480B

MCTOW:	2850 lb. [1293 kg] – Model 480 3000 lb. [1360 kg] – Model 480B
Max. No. of Seats:	5
Noise Standard:	FAR Part 36
Engine:	Rolls-Royce 250-C20W Type Certificate: E4CE Issued by: Federal Aviation Administration

3. Application Details and Background Information

There have been examples of some models of the Enstrom helicopter in New Zealand prior to 1995 when Part 21 was introduced, and those particular model years or serial number ranges were therefore deemed to have a type acceptance certificate under the transitional arrangements of Part 21 Appendix A(c). The type certificate holder Enstrom Helicopter Corporation has now applied for New Zealand type acceptance of the Model 480B. The application dated May 23, 2018 was later expanded to include all the currently supported models on the type certificate that have not previously been type accepted. The first-of-type example was a Model 480B serial number 5095, registered ZK-HRJ. The Enstrom is a single-engine three to five seat light helicopter with three fully-articulated main rotor blades and conventional two-blade tailrotor configuration. A distinguishing feature of the Enstrom helicopter is the lack of exposed pitch change links for the main rotor, as the mechanisms are contained inside the hollow main rotor shaft, lowering aerodynamic drag.

Type Acceptance Certificate Number 18/21B/38 was granted on 18 September 2018 to the Enstrom F-28F/280C/480 Series based on validation of FAA Type Certificate H1CE. Specific applicability is limited to the coverage provided by the operating documentation supplied. There are no special requirements for import into New Zealand.

The first Enstrom F-28 helicopter was type certificated in 1965, and all subsequent models on the type certificate are developments of this. The F-28A was the first improvement and is identical to the F-28 except for the higher power engine variant, which is increased from 195 to 205 shp at 2900 RPM. The Model 280 is a modification of the F-28 with a more aerodynamic styled moulded fibreglass fuselage but essentially the same mechanical components. For each new F-28 version introduced there is a corresponding new 280 version. The F-28C is identical to the F-28A except for a more powerful engine. A Rajay turbocharger, initially approved under STC SE100GL, is production fitted by Enstrom. RPM is increased and the gross weight is slightly higher, while the tail rotor is fitted on the left hand side and rotates in the opposite direction. The F-28F was the last development with a further power increase to 225 hp. The 280FX, for which there is no F-28 equivalent, is the current production version of the 280 Series and features a number of different product improvements such as fairings, new annunciator warning panel and graphic engine monitor and better standard avionics.

The TH-28 was the first turbine engine version of the Enstrom and was developed to compete for a military training helicopter contract. It is a derivative of the 280FX with Rolls Royce 250 turbine powerplant, derated to 285 hp for takeoff and 250 hp maximum continuous, larger cabin and tall landing gear. Although type certificated only a single prototype was produced. The design was then developed into the Model 480 by using a different interior arrangement, and further into the 480B with increased gross weight.

The first Enstrom helicopter in New Zealand was an F-28A serial number 49 registered ZK-HIE in August 1974, while the first example of the F-28C was serial number 390 registered ZK-HKP in September 1977. The first of the 280 Series was a Model 280C serial number 1186 registered ZK-HSE in May 1982, while the first 280FX was serial number 2006 registered ZK-HHN in July 1993.

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 H1CE

FAA Type Certificate Data Sheet no. H1CE at Revision 37 dated October 17, 2017
- Model F-28 approved April 15, 1965
- Model F-28A approved May 28, 1968
- Model 280 approved September 13, 1974
- Models F-28C and 280C approved December 8, 1975
- Models F-28F and 280F approved December 31, 1980
- Model 280FX approved January 14, 1985
- Model 480 approved November 10, 1993
- Model 480B approved February 8, 2001

(2) Airworthiness design requirements:

(i) Airworthiness Design Standards:
The certification basis of the piston-powered Models is CAR 6 effective December 20, 1956, as amended by 6-1 through 6-5. For the turbine-powered Models this was upgraded to FAR 27 effective 1 February 1965, as amended by 27-1 through 27-23, plus some paragraphs at later amendments up to 27-28 as noted on the TCDS.

This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41 and Advisory Circular 21-1A, as CAR 6 was the predecessor to FAR Part 27, which 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:
Nil

(iii) Equivalent Level of Safety Findings:
Nil

(iv) Airworthiness Limitations:
See the Maintenance Manual and Note 3 (Tables 1-3) on the TCDS for critical parts

(3) Aircraft Noise and Engine Emission Standards:

(i) Environmental Standard:
The Models F-28F, 280F, 280FX, 480 and 480B have been certificated for noise under FAR Part 36 (Appendix J) at Amendment 20 effective September 11, 1992.

(ii) Compliance Listing:
Report 28-FT-237 – Results of Enstrom Noise Tests to FAR 36 Appendix J and ICAO Chapter 11

Model 280FX – FAR 36 Appendix J fly-over level at 2350 lb is 79.0 dBA.

Report 28-FT-264 (Rev.B) – Results of Noise Tests of the TH-28/480 with Increased Rotor RPM and Torque Limits

See Flight Manual Performance Section:
Model 480 – FAR 36 Appendix J fly-over noise level at 91 KTAS is 82.4 dBA.
Model 480B – FAR 36 Appendix J fly-over noise level at 93.5 KTAS is 83.7 dBA.

(4) Certification Compliance Listing:

Report No. 28-SA-111: (F-28A) Stress Analysis, Agricultural Kit Installation
Report No. 28-SA-116: Dynamic System Structural Substantiation, Ag. Config.
Report No. 28-DT-134: Ldg Gear Shock Absorption Tests, 2600 to 3100 lbs. G.W.
Report No. 28-DT-136: Dynamic System Flight Strain Survey – Ag. Config.

Report 240: Compliance Checklist and Program Schedule – Model 280

Report 28-DO-289: (Rev.B) Compliance Checklist – Model F-28F, 280F

Report DO-292: Specification – Model F-28F Helicopter
Report DO-293: Specification – Model 280F Helicopter
Report DO-295 (Rev C): Compliance Checklist for Certification of Enstrom 280FX

Report 28-DO-315 (Rev.E): Compliance Checklist – Model 480
Report 28-DO-330 (Rev.E): Compliance Checklist – Model 480B

(5) Flight Manual:

Enstrom F-28A Operator's Manual and FAA-Approved Rotorcraft Flight Manual – Report No.28-AC-009 – CAA Accepted as AIR 242

Enstrom F-28C Operator's Manual and FAA-Approved Rotorcraft Flight Manual – CAA Accepted as AIR 2031

Enstrom 280 Operator's Manual and FAA-Approved Rotorcraft Flight Manual – Report No.28-AC-013 – CAA Accepted as AIR 3848

Enstrom 280C Operator's Manual and FAA-Approved Rotorcraft Flight Manual (s/n 1020, 1023 through 1123) – CAA Accepted as AIR 2170

Enstrom 280C Operator's Manual and FAA-Approved Rotorcraft Flight Manual (s/n 1124 and up, or as modified in accordance with Enstrom Drawing 28-100005) – Report No. 28-AC-016 – CAA Accepted as AIR 2177

Enstrom F-28C Operator's Manual and FAA-Approved Rotorcraft Flight Manual (s/n 418 and up, or as modified in accordance with Enstrom Drawing 28-100005) – Report No. 28-AC-017 – CAA Accepted as AIR 2177

Enstrom F-28F Operator's Manual and FAA-Approved Rotorcraft Flight Manual – Report No.28-AC-018 – CAA Accepted as AIR 3849

Enstrom 280F Operator's Manual and FAA-Approved Rotorcraft Flight Manual – Report No.28-AC-019 – CAA Accepted as AIR 3850

Enstrom 280FX Operator's Manual and FAA-Approved Rotorcraft Flight Manual – Report No.28-AC-020 – CAA Accepted as AIR 2474

Enstrom 480 Operator's Manual and FAA-Approved Rotorcraft Flight Manual – Report No.28-AC-022 – CAA Accepted as AIR 3851

Enstrom 480B Operator's Manual and FAA-Approved Rotorcraft Flight Manual – Report No.28-AC-023 – CAA Accepted as AIR 3852

(6) Operating Data for Aircraft:

(i) Maintenance Manual:
Enstrom 280/280C Maintenance Manual

Enstrom F-28F and 280F Series Maintenance Manual (Includes Supplement for the F-28F (1986) and 280FX)

Enstrom TH-28/480 Series Maintenance Manual

(ii) Current service Information:
Enstrom Index of Service Bulletins and Service Information Letters

(iii) Illustrated Parts Catalogue:
Enstrom F-28/280 Series Illustrated Parts Catalog – 1987 Edition
Model Effectivity: F-28A, 280, F-28C, F-28F, 280F, and 280FX

Enstrom TH-28/480 Series – Illustrated Parts Catalog – 2001 Edition
Model Effectivity: TH-28, 480, and 480B

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

Form CAA 2171 from Enstrom Director of Engineering dated May 29, 2018

(8) Other information:

Report No. 191 – Electrical Load Analysis Primary Helicopter Trainer – F28A

Report 28-DO-287 (Revision A): Electrical Load Analysis – Model F-28F

Report 28-DO-288 (Revision A): Electrical Load Analysis – Model 280F

Report 28-DO-296: Electrical Load Analysis – 24 Volt System – Model F-28F

Report 28-DO-309 (Revision G): Electrical Load and Power Source Capacity – Model TH-28 and 480/480B Helicopters (Day/Night VFR Operations)

Report 28-DO-344: Electrical Load and Power Source Capacity – Model 480B

Report 28-DO-347 (Revision A): Electrical Load Analysis (ELA) and Power Source Capacity – 150-Amp Electrical Power System – Model 480B

Report 28-DO-357: Electrical Load Analysis (ELA) and Power Source Capacity (G1000H) – 150-Amp Electrical Power System – Model 480B

5. New Zealand Operational Rule Compliance

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	***To be determined on an individual aircraft basis***
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 and Exits	***To be determined on an individual aircraft basis***
E.2.1	Emergency Exit Marking	CAR §6.357(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:

CAR Part 91 – Subpart F – Instrument and Equipment Requirements

PARA:	REQUIREMENT:		MEANS OF COMPLIANCE:	
91.505	Seating and Restraints – Safety belt/Shoulder Harness		CAR §6.605(b)	
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	CAR §6.603(a) N/A CAR §6.603(b) CAR §6.603(c) CAR §6.604(a)(1) CAR §6.604(a)(4) CAR §6.604(a)(2)	(8) Coolant Temp (9) Oil Temperature (10) Manifold Pressure (11) Cylinder Head Temp. (12) Flap Position (13) U/c Position (14) Ammeter/Voltmeter	N/A – Air-cooled engine CAR §6.604(a)(3) CAR §6.604(b)(3) CAR §6.604(b)(1) N/A – Helicopter N/A – Fixed skid landing gear ***Compliance as applicable***
91.511 Night	(1)Turn and Slip (2) Position Lights	***Compliance as applicable*** CAR §6.632	(3) Anti-collision Lights (4) Instrument Lighting	CAR §6.637 CAR §6.630
91.513	VFR Communication Equipment		***Operational requirement – To be determined as applicable***	
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 passenger seats Not Applicable – Less than 10 passenger seats Not Applicable – Less than 20 passenger seats Not Applicable – Less than 61 passenger seats	
91.529	ELT – TSO C126 406 MHz after 22/11/2007		***Operational requirement – To be determined as applicable***	
91.531	Oxygen Indicators – Volume/Pressure/Delivery		Not fitted as standard	
91.533	Oxygen for non-Pressurised Aircraft: >30 min above FL100 – Supplemental for crew, 10% Pax		***Operational requirement – To be determined as applicable***	
91.541	SSR Transponder and Altitude Reporting Equipment		***Operational requirement – To be determined as applicable***	
91.543	Altitude Alerting Device – Turbojet or Turbofan		Not Applicable – Not turbo jet or turbofan powered	
91.545	Assigned Altitude Indicator		Not Applicable – Not approved for IFR operations	
A.15	ELT Installation Requirements		***To be determined on an individual aircraft basis***	

CAR Part 135 – Subpart F – Instrument and Equipment Requirements

PARA:	REQUIREMENT:		MEANS OF COMPLIANCE:
135.355	Seating and Restraints – Shoulder harness flight-crew seats		CAR §6.605(b)
135.357	Additional Instruments (Powerplant and Propeller)		***Operational requirement – To be determined as applicable***
135.359	Night Flight	Landing light, Pax compartment	***Operational requirement – To be determined as applicable***
135.361	IFR Operations	Speed, Alt, spare bulbs/fuses	Not Applicable – Not approved for IFR operations
135.363	Emergency Equipment (Part 91.523 (a) and (b))		***Operational requirement – To be determined as applicable***
135.367	Cockpit Voice Recorder		N/A – Only for 2-crew helicopters with more than 10 pax
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

NOTES: 1. A Design Rule reference in the Means of Compliance column indicates the Design Rule was directly equivalent to the CAR requirement, and compliance is achieved for the basic aircraft type design by certification against the original Design Rule.

2. The CAR Compliance Tables above were correct at the time of issue of the Type Acceptance Report. The Rules may have changed since that date and should be checked individually.

3. Some means of compliance above are specific to a particular model/configuration. Compliance with Part 91/119 operating requirements should be checked in each case.

Attachments

The following documents form attachments to this report:

Three-view drawings Enstrom Models F-28F and 480B
Copy of FAA Type Certificate Data Sheet Number H1CE

Sign off

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David Gill	Checked – Gaetano Settineri
Team Leader Airworthiness	Airworthiness Engineer

Appendix 1

List of Type Accepted Variants:

Model:	*Applicant:*	*CAA Work Request:*	*Date Granted:*
Enstrom F-28A, F-28C	Advisory Circular 21-1.2/NZCAR Part 21 Appendix A(c)		
Enstrom 280C, 280FX	Advisory Circular 21-1.2/NZCAR Part 21 Appendix A(c)		
Enstrom 280, F-28F, 280F	Enstrom Helicopter Corp.	18/21B/38	18 September 2018
Enstrom 480, 480B	Enstrom Helicopter Corp.	18/21B/38	18 September 2018