
Type Acceptance Report

TAR 6/21B/24

Dornier Do 228 Series

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Executive Summary

New Zealand Type Acceptance has been granted to the Dornier Do 228 Series based on validation of EASA Type Certificate number 2031. 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 §21.177, subject to any outstanding New Zealand operational requirements being met. (See Section 5 of this report for a review 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(b).

1. Introduction

This report details the basis on which Type Acceptance Certificate No.6/21B/24 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 which must be complied with prior to the issue of a NZ Airworthiness Certificate or for any subsequent operations.

2. Foreign Type Certificate Details

Manufacturer:	Dornier Luftfahrt GmbH
TC Holder:	RUAG Aerospace GmbH
Model:	Do 228-202
Type Certificate:	2031B
Issued by:	European Aviation Safety Agency (under a “grandfathering” agreement in accordance with European Commission Regulations (EC) 1592/2002 and 1702/2003)
MCTOW	6200 kg (13669 lb.)
Max. No. of Seats:	21
Noise Standard:	German Noise Requirements (LSL) of August 1, 1985, Chapter VI [Flyover Noise Level at 6200 kg: 76.3 dB(A) – See FM §2]

Engine: Garrett AiResearch TPE331-5-252D
Type Certificate: E4WE
Issued by: Federal Aviation Administration

Propeller: Hartzell HC-B4TN-5ML/LT10574
Type Certificate: P40EA
Issued by: Federal Aviation Administration

3. Type Acceptance Certificate

The application for New Zealand type acceptance of the Dornier 228-202 was from Air West Coast Ltd, dated 14 March 2006. The first-of-type example was serial number 8100, to be registered ZK-VIP. The Dornier 228 Series is an all-metal high-wing twin turboprop unpressurized 19-passenger commuter category airliner.

Type Acceptance Certificate No. 6/21B/24 was granted on 31 August 2006 to the Dornier 228-202 based on validation of EASA Type Certificate No. 2031. Specific applicability is limited to the coverage provided by the operating documentation supplied. There are no special requirements for import into New Zealand.

The 228 was a major development of the Do 28D Skyservant using a completely new wing with twin turbine engines, lengthened fuselage and new undercarriage. The 228-200 Series was a stretched version of the original 228-100, but with reduced range. However the later 228-202 had an increased MAUW which allowed the original fuel capacity to be restored.

The Dornier 228 Series was originally type accepted under NZCAR B.8 in 1991, when one Model 228-101 (ZK-TRD) and two 228-212 (ZK-TRA and -TRB) were imported by Astral Air Services. However the airline folded after six weeks of operation and type acceptance had since lapsed.

4. Type Data

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) Type certificate:

LBA Musterzulassungsschein (Type Certificate) Nr 2031
– Model Dornier 228-202 approved 06 August 1986

LBA Kennblatt (Type Certificate Data Sheet) number 2031B/SA
– Variant Do 228-202 – Issue 11 dated 8 April 2005

(2) Airworthiness design requirements:

The certification basis of the Do 228-101/201/202 is FAR Part 23 of February 1, 1965 including Amendments 23-1 through 23-23, except for §23.1 which is substituted by Amendment 23-6, plus Appendix A to FAR Part 135 of December 1, 1978 with one exception, and SFAR 41C (ICAO Annex 8) of September 13, 1982. One equivalent safety finding was made for the -101 model (only one exit is fitted on the RHS, which was justified by an evacuation test), which was previously reviewed and accepted in 1991. This is an acceptable certification basis in accordance with NZCAR Part 21B Para §21.41 and Advisory Circular 21-1A, as SFAR 41 was the predecessor of the Commuter Category in FAR 23, which is the basic standard 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.

(3) Environmental Certification:

LBA Noise Type Certificate Nr. 310.3/1/2031b/5 – Dornier 228-202

(4) Certification compliance listing:

Doc. No. EQ-79/83 – Stress and Strength Report – Dornier 228

Doc. No. QF-328/84 Dornier 228 Models 100/200/101/201 – Status of Compliance Statements to FAR 23 Effective 01 Feb 1965 Including Amendment 1-23

QF-128/85 Models 101/201 – Status of Compliance SFAR 41B Dated 08 Dec 1980

Doc. No. QF-304/84 Dornier 228 Models 100/200/101/201 – Status of Compliance Statements to FAR Part 135 Appendix A Effective 25 Sept 1978

Doc. No. QF-441/84 List of Documents Established for the LBA-Type Certification of the Models Dornier 228-100/-200

LBA-Change Notice No. Ä 228-52 – Increase in MLW/MZFW 228-202

LBA-Change Notice No. Ä 228-164 – Increase in MTOW 228-202
(includes Translation of Compliance Summary)

QF 10-314/81 Dornier 228-100 Items of Equivalent Safety (Translation)

FAR §23.207(c) Stall Warning – A higher warning threshold (15 kts) was accepted for power-on stalls because in other configurations the margin was only just above minimum.

FAR 135 App.A §32(c)(2) Number of Emergency Exits – Only one exit was accepted on the RHS, in lieu of two, after an emergency evacuation demonstration. (17 occupants in 45 seconds)

LBA Telex dated 24 February 1984 – Grants dispensation against FAR 135 Appendix A point 7(b) Landing Field length. This allows publication in the Flight Manual of both raw and factored landing distances, to provide for different national operating requirements.

(5) Flight manual: LBA-Approved Flight Manual for the Dornier 228-202
CAA Accepted as AIR 2953

(6) Illustrated Parts Catalogue:

TM-APIC-301082-ALL – Airplane Illustrated parts Catalogue

(7) Maintenance manual and service data for aircraft:

TM-AMM-011804-ALL – Airplane Maintenance Manual

TM-TLMCM-010305-ALL – Time Limits/Maintenance C Manual

TM-SIPM-010492-ALL – Structural Inspection Program Manual

TM-SRM-010684 – Service Bulletins/Service Information

TM-LOAP-01081-ALL – List of Applicable Publications

(8) Agreement from manufacturer to supply updates of data in (5), (6) and (7):
email from RUAG Aerospace dated 23 March 2006

(9) Other information:

Airplane Master Equipment List – for all Models 200 Standard Series

Doc. NE10-944/90 – Electrical Load Analysis Do-228 s/n 8181

Dornier 228 MZ6 – Summary of Basic Aircraft Modifications

5. Additional New Zealand Requirements

Compliance with the retrospective airworthiness requirements of NZCAR Part 26 is a prerequisite for the grant of a type acceptance 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	<i>To be determined on an individual aircraft basis</i>
B.2	Crew Protection Requirements – CAM 8 Appdx. B # .35	Not Applicable – Agricultural Aircraft only

Appendix C - Air Transport Aircraft - More than 9 Pax

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
C.1	Doors and Exits	FAR §23.807(b) / FAR 135 Appendix A-32(a)
C.2.1	Additional Emergency Exits – per FAR 23.807(b) @ 10.5.93	FAR 135 Appendix A-32(c) (2)
C.2.2	Emergency Exit Evacuation Equipment – Descent means	FAR §23.807(d)(1) – Do228 exits <2m from the ground
C.2.3	Emergency Exit Interior Marking – Size/self-illuminating	FAR 135 Appendix A-32(e)
C.3.1	Landing Gear Aural Warning – Automatic Flap Linking	FAR §23.729(f)

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:

Civil Aviation Rules Part 91

Subpart F - Instrument and Equipment Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
91.505	Seating and Restraints – Safety belt/Shoulder Harness	FAR §23.785(c)
91.507	Pax Information Signs - Smoking, safety belts fastened	SFAR 41 §7(a)(2)
91.509 Min. VFR	(1) ASI (2) Machmeter (3) Altimeter (4) Magnetic Compass (5) Fuel Contents (6) Engine RPM (7) Oil Pressure	FAR §23.1303(a) N/A – No Mach limitations FAR §23.1303(b) FAR §23.1303(c) FAR §23.1305(a) FAR §23.1305(e) FAR §23.1305(b)
91.511 Night	(1) Turn and Slip (2) Position Lights	<i>Compliance as applicable</i> FAR §23.1385
91.517	IFR Instruments and Equipment	<i>Operational requirement – Compliance as applicable</i>
91.519	IFR Communication and Navigation Equipment	<i>Operational requirement – Compliance as applicable</i>
	NOTE: See Kinds of Operations Equipment List in Flight Manual Section 2 – Limitations A full range of King/Collins/Pro Line II Avionic Equipment is available – See FM Section 9 List of Optional Systems	
91.523	Emergency Equipment (a) More Than 10 pax - First Aid Kits per Table 7 - Fire Extinguishers per Table 8 (b) More than 20 pax - Axe readily acceptable to crew (c) More than 61 pax - Portable Megaphones per Table 9	<i>Operational requirement – Compliance as applicable</i> <i>Operational requirement – Compliance as applicable</i> Not Applicable – Less than 20 passenger seats Not Applicable – Less than 61 passenger seats
91.529	ELT - TSO C91a or C126 after 1/4/97 (or replacement)	Available under Option/Mod. code S57 – See FM S05/57A
	Note: 406 MHz COSPAS/SARSAT Frequency ELT can be fitted to all Do228 Models in accordance with SB228-256	
91.531	Oxygen Indicators - Volume/Pressure/Delivery	<i>Operational requirement – Compliance as applicable</i>
91.533	Oxygen for Non-Pressurised Aircraft >30 min above FL100 - Supplemental for crew, 10% Pax - Therapeutic for 3% of Pax Above FL100 – Supplemental, Therapeutic, 120 l PBE	Maximum operating altitude in Flight Manual Section 2 is 15,000 ft unless an MAAS is installed. Oxygen system not fitted as standard – Optional systems covered by Supplements P24/25/27 in Flight Manual
91.541	SSR Transponder and Altitude Reporting Equipment	<i>Operational requirement – Compliance as applicable</i>
91.543	Altitude Alerting Device - Turbojet or Turbofan	Not Applicable – Not turbo jet or turbofan powered
91.545	Assigned Altitude Indicator	<i>Operational requirement – Compliance as applicable</i>
A.15	ELT Installation Requirements	Dornier confirmed in 1991 that factory ELT installation met similar NZCAR C.4 mounting stiffness requirements

Civil Aviation Rules Part 125

Subpart F - Instrument and Equipment Requirements

PARA:	REQUIREMENT:	MEANS OF COMPLIANCE:
125.355	Seating and Restraints	FAR §23.785(c)
125.357	Additional Instruments (Powerplant and Propeller)	FAR §23.1305
125.359	Night Flight	Landing light, Pax compartment
125.361	IFR Operations	Speed, Alt, spare bulbs/fuses
125.361	SE IFR Requirements – If Applicable	Operational requirement – Compliance as applicable
125.363	Emergency Equipment (Part 91.523 (a) and (b))	Operational requirement – Compliance as applicable
125.365	Public Address and Crew Member Intercom System	Not Applicable – Not a single-engined aeroplane
125.367	Cockpit Voice Recorder - Appendix B.3 requires TSO C84/C123	Becker cabin interphone system available – See AFM 9108
125.369	Flight Data Recorder - Appendix B.4 requires TSO C124 (18 parameters required for 19 pax build before 31.3.1997)	Fairchild Model A200S available as an option under Change Notice B-88 R3 – See FM Supplement 9352
125.371	Additional Attitude Indicator	Fairchild Model F1000 optional under Change Notice B-112 R2 (21 parameters) – See FM Supplement 9373
125.373	Weather Radar Appendix B.6 requires TSO C63	Not Applicable – Not turbo jet or turbofan powered
125.375	Ground Proximity Warning System Appendix B.7 requires TSO C92	King KWX56 available as option – See FM Supplement S15 Also: Primus 100 (S31); WXR270 (S80); Primus 500 (S97)
125.377	HUMS	Sundstrand Mk.II optional under Change Notice B-102 – See FM Supplement S18
125.379	Terrain Awareness and Warning System (TAWS) Appendix B.9 requires TSO C151a or b	Not Applicable – Not a single-engined aeroplane
125.381	Airborne Collision Avoidance System (ACAS II) Appendix B.10 requires TSO C118/119a or C119b	Operational requirement – Compliance as applicable

Attachments

The following documents form attachments to this report:

- Photographs first-of-type example 228-202 s/n 8100 ZK-VIP
- Three-view drawing Dornier Model 228-200
- Copy of LBA Type Certificate Data Sheet Number 2031B/SA

Sign off

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David Gill
Team Leader Airworthiness

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Checked – AWE3
Date: 31 August 2006

Appendix 1

List of Type Accepted Variants:

Model:	Applicant:	CAA Work Request:	Date Granted:
Do 228-202	Air West Coast Limited	6/21B/24	31 August 2006