



European Aviation Safety Agency

EASA

**TYPE-CERTIFICATE
DATA SHEET**

No. EASA.IM.A.115

for
BOEING 787

Type Certificate Holder:
The Boeing Company

1901 Oakesdale Ave SW
Renton, WA 98057-2623
USA

Airworthiness Category: Large Aeroplanes

For Model: 787-8
787-9

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SECTION 1: 787-8

I. General

This Data Sheet, which is part of Type Certificate No. IM.A.115, prescribes conditions and limitations under which the product for which the Type Certificate was issued meets the airworthiness requirements of the European Aviation Safety Agency.

1. Type / Model / Variant

787-8

2. Performance Class

A

3. Certifying Authority

Federal Aviation Administration (FAA)
Seattle Aircraft Certification Office
1601 Lind Avenue S.W.
Renton, WA 98055-4056
United States of America

4. Manufacturer

The Boeing Company
1901 Oakesdale Ave SW
Renton, WA 98057-2623
United States of America

5. FAA Certification Application Date

October 01, 2006

6. EASA Validation Application Date

October 01, 2006

7. FAA Type Certification Date

August 26, 2011

8. EASA Type Validation Date

August 26, 2011

II. Certification Basis

1. Reference Date for determining the applicable requirements October 01, 2006

2. FAA Type Certification Data Sheet No. T00021SE

3. FAA Certification Basis
October 01, 2006

4. EASA Airworthiness Requirements

EASA Certification Specification 25, Amendment 1, effective as of December 12, 2005, except where identified below.

Certification Specification All Weather Operations (CS AWO), Book 1 and 2 published October 17, 2003.

5. Special Conditions

<u>CRI</u>	<u>Subject</u>
B-05	Control Surface Position Awareness
B-11	Human Factors
C-01	Crashworthiness of Composite Structure
C-02	Design Manoeuvre Requirements
C-04	Engine and APU Load Conditions
C-07	Fuel Tank Structural Integrity / Fuel Tank Access Covers
C-13	Tyre / Wheel Debris – Fuel Tank Penetration
D-03	High Altitude Operation / High Cabin Heat Load
D-06	Fire Resistance of Thermal Insulation Material
D-09	Type C Passenger Exits
D-12	Fuselage Doors
D-15	Post-Crash Fire Resistance of Composite Material
D-16	In-Flight Fire Resistance of Composite Material
D-22	Flight and Attendant Overhead Crew-rest
D-23	Application of Heat Release Requirements to Seat Installations
D-24	Strengthened Flight Deck Bulkhead
E-03	Engine and APU Intake Icing – Falling and Blowing Snow
E-07	Flammability Reduction System (Nitrogen Generation System)
E-11	Composite Wing and Fuel Tank Fire Protection
E-14	Fuel Quantity Indicating System
F-03	Protection from External High Intensity Radiated Fields (HIRF)

<u>CRI</u>	<u>Subject</u>
F-22	Isolation or Protection of Aircraft Control Domain and Airline Information Services Domain from the Passenger Information and Entertainment Services Domain
F-24	Lithium-Ion Batteries
F-25	Aircraft System Security for the Aircraft Control Domain and Airline Information Services Domain from Internet and Operator Network Access and Electronic Transmission of Field-Loadable Software Applications and Databases
F-29	Flight Recorders, Data Link Recording
H-01	Enhanced Airworthiness Programme for Aeroplane Systems – ICA on EWIS

6. Exemptions

N/A

7. Deviations

<u>CRI</u>	<u>Subject</u>
B-07	Cockpit Controls
E-20	Indication of Gross Fuel Contamination (RR engines)
E-21	Indication of Gross Fuel Contamination (GENx engines)

Notes: CRI E-20 is a time limited Deviation. For Model 787-8 airplanes granted a certificate of airworthiness prior to October 31, 2014, the "Airworthiness Limitation" section of the Model 787-8 airplane "Instructions for Continued Airworthiness" must state that delivered airplanes cannot be operated after December 31, 2016, unless the appropriate design changes are incorporated by the owner or operator. If an application for an airworthiness certificate is made on or after October 31, 2014, the affected airplanes must incorporate the indication of impending bypass of the fuel oil heat exchanger

CRI E-21 is a time limited Deviation. For Model 787-8 airplanes granted a certificate of airworthiness prior to October 31, 2014, the "Airworthiness Limitation" section of the Model 787-8 airplane "Instructions for Continued Airworthiness" must state that delivered airplanes cannot be operated after December 31, 2016, unless the appropriate design changes are incorporated by the owner or operator. If an application for an airworthiness certificate is made on or after October 31, 2014, the affected airplanes must incorporate the indication of impending bypass of the fuel oil heat exchanger

8. Equivalent Safety Findings

The following table lists the Equivalent Safety Finding requests made by Boeing which are specific to the 787-8 model.

<u>CRI</u>	<u>Subject</u>
B-06	Trim Systems
B-09	Out of Trim Characteristics
B-12	Standby Air Data System
C-03	Dive Speed Definition, with Speed Protection System.

D-04	Strengthened Flight Deck Door
D-08	Flight Control System Failures
D-17	Lighted "No Smoking" Signs in lieu of Placards
D-18	Emergency Exit Door Arrow and "OPEN" Colour
D-25	Crew Determination of Quantity of Oxygen in Passenger Oxygen System
D-28	Door Indications
E-04	Thrust Reverser Testing
E-05	Hydraulics Bay in Aft Strut Fairing
E-09	GENx Cowl TAI Duct
E-12	Ignition Switches
E-17	RR Turbine Overheat Detection
E-24	GENx Engine Fuel Filter Location
F-14	Use of Earth Reference System (ERS) accelerometers in lieu of the CG mounted Flight Data Recorder Accelerometers
F-18	Minimum Mass Flow of Supplemental Oxygen
F-27	Instrument Systems
F-30	First Aid Portable Pulse Oxygen System
G-04	Fire Handle Design
G-02-10	Green Arc for Powerplant Instruments*
G-GEN1	ICA

*Considered from approval ref 10063714

The following table lists those subjects where Boeing has requested continued use of Equivalent Safety Finding CRIs previously agreed by JAA on earlier Boeing programmes. These have been reviewed by the EASA 787 team for their suitability, based on consideration of similarity of design, requirements and any relevant policy/guidance material. All of these ESFs are considered to be non-controversial.

<u>CRI</u>	<u>Subject</u>
777 F-9	Access to oxygen dispensing units in galley/work areas
777 D-LR-6	Door Sill Reflectance
777 F-LR-3	Exterior Exit Markings
777 F-LR-4	Pneumatic Systems – High Pressure, escape slide cylinders and associated piping.
777 F-12	Non-unique Overspeed Aural Warning
777 F-LR-1	Dedicated Reset Switch, Overspeed Warning

9. Elect to Comply

For the 787-8 Boeing has elected to comply with the full content of the mature NPAs listed below that were not incorporated into CS 25 Amendment 1.

<u>NPA</u>	<u>Subject</u>
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<u>NPA</u>	<u>Subject</u>
JAA NPA 25D-320 April 02, 2001	Standards for Cargo and Baggage Compartments
JAA NPA 25G-334 September 01, 2002	Contaminated Runways Equivalent Level of Safety
EASA NPA 2008-01 June 06, 2008	Extended Range Operations with Two-Engined Aeroplanes ETOPS Certification and Operation (AMC 20-6)

Additionally, for the aircraft having embodied the modification and approval related to the *Major Change Approval ref 10057983 "Model 787 - Automatic Dependent Surveillance – Broadcast (ADS-B in and Out) new functionality"*, Boeing elect to comply with:

CS-ACNS, Initial Issue, dated 17 December 2013, Book 1, Subpart D -- Surveillance, Sections: 1, 2, 3, 4

10. Environmental Protection Standards

Boeing has elected to comply with:

ICAO Annex 16, Volume I, Amendment 9 (Fifth Edition), Chapter 4 for Noise; and
ICAO Annex 16, Volume II (Third Edition), Amendment 7, for Emissions.

For details of the certified noise levels see TCDSN EASA.IM.A.115.

III. Technical Characteristics and Operational Limitations

1. Type Design Definition

787-8: D061Z022-02, Revision C, dated 11 August 2011, and Major Level 1 Change (EASA Project No. 0010012573-001).

2. Description

Twin turbo-fan, twin-aisle, long range, large aeroplane.

3. Equipment

The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft for certification.

4. Dimensions

Wingspan	60.1218 meters [197 feet, 3 inches]
Fuselage Length	56.7182 meters [186 feet, 1 inch]
Fuselage Constant Diameter	5.7531 meters [18 feet, 10.5 inches]

5. Engines

Two (2) Rolls-Royce plc Turbofan Engines: (EASA Engine Type Certificate No. E.036)
Models: Trent 1000-A, Trent 1000-A2, Trent 1000-C, Trent 1000-C2, Trent 1000-D, Trent 1000-D2, Trent 1000-E, Trent 1000-G, Trent 1000-G2, Trent 1000-H, Trent 1000-H2, Trent 1000-L2, Trent 1000-AE3, Trent 1000-CE3, Trent 1000-D3, Trent 1000-G3, or Trent 1000-H3

Two (2) General Electric Engines: (EASA Engine Type Certificate No. E.102)
Models: GEnx-1B64, GEnx-1B64/P1, GEnx-1B64/P2, GEnx-1B67 GEnx-1B67/P1,
GEnx-1B67/P2, GEnx-1B70, GEnx-1B70/P1, GEnx-1B70/P2, GEnx-1B70/75/P1 or
GEnx-1B70/75/P2

Engine Limits:

	Static thrust at sea level:	
RB211 Trent 1000-A with or without M/SB 72-G319 incorporated	307.8 kN (69,194 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
RB211 Trent 1000-C with M/SB 72-G319 incorporated	331.4 kN (74,511 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
RB211 Trent 1000-D with M/SB 72-G319 incorporated	331.4 kN (74,511 lbf)	Takeoff (5 min)* (flat rated to 35 deg C)
RB211 Trent 1000-E with M/SB 72-G319 incorporated	265.3 kN (59,631 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)

RB211 Trent 1000-G with M/SB 72-G319 incorporated	320.6 kN (72,066 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
RB211 Trent 1000-H with M/SB 72-G319 incorporated	284.2 kN (63,897 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
RB211 Trent 1000-A2	307.8 kN (69,194 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
RB211 Trent 1000-C2	331.4 kN (74,511 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
RB211 Trent 1000-D2	331.4 kN (74,511 lbf)	Takeoff (5 min)* (flat rated to 35 deg C)
RB211 Trent 1000-G2	320.6 kN (72,066 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
RB211 Trent 1000-H2	284.2 kN (63,897 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
RB211 Trent 1000-L2	331.4 kN (74,511 lbf)	Takeoff (5 min)* (flat rated to 25 deg C)
RB211 Trent 1000-AE3	307.8 kN (69,194 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
RB211 Trent 1000-CE3	331.4 kN (74,511 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
RB211 Trent 1000-D3	331.4 kN (74,511 lbf)	Takeoff (5 min)* (flat rated to 35 deg C)
RB211 Trent 1000-G3	320.6 kN (72,066 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
RB211 Trent 1000-H3	284.2 kN (63,897 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
GENx-1B64 applicable to Bill of Material GENx-1B64G03 and GENx-1B64G04	298.0 kN (67,000 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
GENx-1B64/P1 applicable to Bill of Material GENx-1B64/P1G01	298.0 kN (67,000 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
GENx-1B64/P2 applicable to Bill of Material GENx-1B64/P2G01 or GENx-1B64/P2G02	298.0 kN (67,000 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
GENx-1B67 applicable to Bill of Material GENx-1B67G03 and GENx-1B67G04	308.7 kN (69,400 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
GENx-1B67/P1 applicable to Bill of Material GENx-1B67/P1G01	308.7 kN (69,400 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
GENx-1B67/P2 applicable to Bill of Material GENx-1B67/P2G01 or GENx-1B67/P2G02	308.7 kN (69,400 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
GENx-1B70 applicable to Bill of Material GENx-1B70G03 and GENx-1B70G04	321.6 kN (72,300 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
GENx-1B70/P1 applicable to Bill of Material GENx-1B70/P1G01	321.6 kN (72,300 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
GENx-1B70/P2 applicable to Bill of Material GENx-1B70/P2G01 or GENx-1B70/P2G02	321.6 kN (72,300 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
GENx-1B70/75/P1 applicable to Bill of Material GENx-1B70/75/P1G01	321.6 kN (72,300 lbf)	Takeoff (5 min)* (flat rated to 38.8 deg C)
GENx-1B70/75/P2 applicable to Bill of Material	321.6 kN	Takeoff (5 min)*

GENx-1B70/75/P2G01 or GENx-1B70/75/P2G02	(72,300 lbf)	(flat rated to 38.8 deg C)
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* 10 minutes at takeoff thrust allowed only in case of engine failure

Other engine limitations: See the relevant Engine Type Certificate Data Sheet.

6. Auxiliary Power Unit

One (1) no bleed-air APU, Hamilton Sundstrand APS5000

Limitations and Operating Procedures - See the appropriate EASA approved Airplane Flight Manual (See Section 1 Paragraph **IV** sub-paragraph 1.)

7. Propellers

N/A

8. Fluids (Fuel, Oil, Additives, Hydraulics)

Fuels: Rolls-Royce plc Turbofan Engines*

Nomenclature	Specification	
	U.S.A.	RUSSIA
KEROSENE	ASTM D-1655 grades Jet-A and Jet A-1	
	MIL-DTL-83133 grade JP-8	
		GOST 10227-86 grade TS-1
High Flash Point	MIL-DTL-5624 grade JP-5	

Fuels: General Electric Turbofan Engines*

Nomenclature	Specification	
	U.S.A.	RUSSIA
KEROSENE	ASTM D-1655 grades Jet-A and Jet A-1	
	MIL-DTL-83133 grade JP-8	
		GOST 10227-86 grade TS-1
High Flash Point	MIL-DTL-5624 grade JP-5	

* Fuels conforming to the specifications in the table are acceptable. Fuels produced to other specifications and having properties meeting the requirements of the above specifications are acceptable for use (refer to applicable approved Manuals). The fuel and any fuel additives must conform to the relevant Engine Operating Instructions.

See the appropriate EASA approved Airplane Flight Manual
(See Section 1 Paragraph **IV** sub-paragraph 1)

Oils

Oils: Refer to applicable associated Manuals.

Hydraulics

Hydraulic Fluids: Refer to the applicable associated Manuals.

9. Fluid Capacities

Tanks	Usable Fuel			
	U.S. Gallons	Pounds*	Liters	Kilograms*
Main L or R	5,570	37,319	21,085	16,868
Center	22,200	148,740	84,036	67,229
Total	33,340	223,378	126,206	100,965

	Unusable Fuel			
	U.S. Gallons	Pounds*	Liters	Kilograms*
Drainable	32.4	217	122.6	98
Trapped	72.4	485	274.1	219
Total	104.8	702	396.7	317

* Fuel Density is 6.7 Pounds / U.S. Gallon and 0.8 Kilograms / Liter

See appropriate Weights and Balance Manual
(See Section 1 Paragraph IV sub-paragraph 3)

10. Airspeed Limits

$$V_{MO}/M_{MO} = 350\text{KEAS} / 0.90M.$$

For other airspeed limits, see the appropriate EASA approved Airplane Flight Manual
(See Section 1 Paragraph IV sub-paragraph 1)

11. Flight Envelope

Maximum Operating Altitude: 43,100 feet

See the appropriate EASA approved Airplane Flight Manual
(See Section 1 Paragraph IV sub-paragraph 1)

12. Operating Limitations

See the appropriate EASA approved Airplane Flight Manual
(See Section 1 Paragraph IV sub-paragraph 1)

12.1 Approved Operations

The airplane is approved for the following kinds of flight and operation, both day and night, provided the required equipment is installed and approved in accordance with the applicable regulations/specifications:

- Visual (VFR)
- Instrument (IFR)
- Icing Conditions
- Low weather minima (CAT I, II, III operations)
- RVSM
- B-RNAV
- Gear down dispatch
- Towbarless Towing
- Wet and contaminated runway operations

- Extended Over-Water

All Weather Capability

The aircraft is qualified to Cat III precision approach and autoland.

12.2 Other Limitations

Operational Limits

Runway slope – $\pm 2\%$

Maximum Takeoff and Landing Tailwind Component – 15 knots*

Maximum Operating Altitude – 43,100 feet pressure altitude

* The capability of the airplane has been satisfactorily demonstrated for takeoff and manual and automatic landings with tailwinds up to 15 knots. This finding does not constitute operational approval to conduct takeoffs and landings with tailwind components in excess of 10 knots.

13. Maximum Certified Masses

Maximum Taxi Weight	Maximum Takeoff Weight	Maximum Landing Weight	Maximum Zero Fuel Weight	Minimum Flight and Zero Fuel Weight
503,500 LB	502,500 LB	380,000 LB	355,000 LB	229,500 LB
228,383 KG	227,930 KG	172,365 KG	161,100 KG	104,100 KG

Notes: The maximum weight limits may be less as limited by center of gravity, fuel density and fuel loading limits, as given in the EASA approved Airplane Flight Manual (See Section 1 Paragraph IV sub-paragraph. 1). Refer to the Weight and Balance Manual (See Section 1 Paragraph IV sub-paragraph 3) for additional specific airplane loading limitations.

The Minimum Flight Weight does not include usable fuel.

See the appropriate EASA approved Airplane Flight Manual
(See Section 1 Paragraph IV sub-paragraph 1)

14. Centre of Gravity Range

See the appropriate EASA approved Airplane Flight Manual
(See Section 1 Paragraph IV sub-paragraph 1)

15. Datum

Station 0.0, located 1.41732 meters [55.8 inches] forward of airplane nose (B.S. 55.8).

16. Mean Aerodynamic Chord (MAC)

6.27126 meters [246.9 inches]

17. Levelling Means

A plumb bob attachment and levelling provision scale are provided in the left main gear wheel well.

18. Minimum Flight Crew

Two (2): Pilot and co-pilot

19. Minimum Cabin Crew

The table below provides the certified Maximum Passenger Seating Capacities (MPS), the corresponding cabin configuration (exit arrangement and modifications) and the associated numbers of cabin crew members used to demonstrate compliance with the evacuation certification requirements of CS 25.803. Additional cabin crew members may be required to comply with other regulatory requirements (e.g., cabin attendant direct view).

Passenger Seating Capacity & Cabin Configuration	Cabin crew
381 passengers: (A, A, A, A) exit arrangement	8
350 passengers: (A, A, A, A) exit arrangement	7
355 passengers: (C, A, A, A) exit arrangement	8
350 passengers: (C, A, A, A) exit arrangement	7
330 passengers: (A, A, C, A) exit arrangement	7
300 passengers: (A, A, C, A) exit arrangement	6
300 passengers: (C, A, C, A) exit arrangement	6

20. Maximum Seating Capacity

The maximum number of passengers approved for emergency evacuation taking into account the introduction of Type C emergency exits in EASA Type Certification Basis via 787 Special Condition CRI D-09 is:

- 381 with four pairs of exit in an (A, A, A, A) exit arrangement
- 355 with four pairs of exit in an (C, A, A, A) exit arrangement
- 330 with four pairs of exit in an (A, A, C, A) exit arrangement
- 300 with four pairs of exit in an (C, A, C, A) exit arrangement

Maximum passenger capacity may be further limited by Environmental Control System ventilation per occupant as defined in CS 25.831(a) as amended by EASA 787 Special Condition CRI D-03.

21. Baggage/ Cargo Compartment

Cargo Compartment	Maximum Load	
	Pounds	Kilograms
Forward	56,250	25,514
Aft	42,180	19,132
Bulk	6,030	2,735

See appropriate Weight and Balance Manual, Boeing Document D043Z580-aaaa (where aaaa is the owner identifier).
(See Section **IV** para. 3)

22. Wheels and Tyres

Nose Assy (Qty 2)

Tyre: 40x16.0R16

Wheel: S685Z001-390 or -590

Main Assy (Qty 8)

Tyre: 50x20.0R22

Wheel: S685Z001-360 or -561

23. ETOPS

The 787-8 has been evaluated in accordance with the type design requirements of CS 25.1535 and found suitable to 330-minute ETOPS operations when operated and maintained in accordance with Boeing Document No. D021Z002-01, "Model 787 ETOPS Configuration, Maintenance, and Procedures." This finding does not constitute approval to conduct ETOPS operations.

IV. Operating and Service Instructions

1. Airplane Flight Manual (AFM)

Boeing Document D631Z003

2. Instructions for Continued Airworthiness and Airworthiness Limitations

Boeing Document D011Z009-02	787 Maintenance Review Board Document (MRBR)
Boeing Document D011Z009-03	Maintenance Planning Document (MPD)
Boeing Document D011Z009-03-01	Airworthiness Limitations (AWLs)
Boeing Document D011Z009-03-02	Line Number Specific Airworthiness Limitations (AWLs)
Boeing Document D011Z009-03-03	Certification Maintenance Requirements (CMRs)
Boeing Document D011Z009-03-04	Special Compliance Items (SCIs)
Boeing Document D021Z002-01	787 ETOPS Configuration, Maintenance and Procedures (CMP)

3. Weight and Balance Manual (WBM)

Boeing Document D043Z580-aaaa-xxxxx (Note 1)

Note 1 .A current weight and balance report, including a list of equipment included in the certificated empty weight and loading instructions when necessary, must be provided for each aircraft at the time of original certification. (aaaa is the owner identifier and xxxxx is the aircraft serial number)

Note 2 Airplane operation must be in accordance with the EASA approved Airplane Flight Manual, Boeing Document D631Z003. All placards required by either the EASA approved Flight Manual, the applicable operating rules, or the Certification Basis must be installed in the airplane.

V. Operational Suitability Data (OSD)

The Operational Suitability Data elements listed below are approved by the European Aviation Safety Agency under the EASA Type Certificate IM.A.115 as per Commission Regulation (EU) 748/2012 as amended by Commission Regulation (EU) No 69/2014.

1. Master Minimum Equipment List

- a. Master Minimum Equipment List (MMEL reference D630Z004-02) approved at revision 9, dated on 30 September 2015 (or later approved revisions) as per the defined Operational Suitability Data Certification Basis : JAR-MMEL / MEL, section 1 Subpart A & B
- b. Required for entry into service by EU operator.

2. Flight Crew Data

- a. The Flight Crew data (FCD reference D015Z033-01) approved at Revision New, dated on 10 December 2015 (or later approved revisions) as per the defined Operational Suitability Data Certification Basis : CS-FCD, initial Issue.
- b. Required for entry into service by EU operator.
- c. Pilot Type Rating: "B777/787".
Note: These data cover the models B787-8, -9 and B777-200, -300 and -777F series aircraft. Differences are addressed in D015Z033-01.

3. Cabin Crew Data

- a. The Cabin Crew data (CCD reference D6-85797, Operational Suitability Data-Cabin Crew Data - Boeing 777/787) approved at revision A, dated on 1st August 2015 (or later approved revisions) as per the defined Operational Suitability Data Certification Basis : CS-CCD, Initial Issue.
- b. Required for entry into service by EU operator.
- c. The B787-8 and B787-9 models are determined to be the same aircraft type for Cabin Crew. The B787-8/-9 aircraft models are determined to be variants, in terms of Cabin Crew, to the B777 (B777-200 / -200ER / -200LR / -300 / -300ER) aircraft model(s).

VI. Notes

1. Boeing and GE have determined that the GENx engines on these 787-8 aircraft intermittently emit a sometimes clearly visible fuel vapor fog after shutdown, as a result of a small quantity of fuel being released from the engine's fuel system. These emissions do not present a safety issue or appreciable environmental impact. Boeing and GE will modify the design of the aircraft and engines by December 31, 2012 to completely eliminate this fuel venting on new aircraft. Boeing has included an airworthiness limitation in the instructions for continued airworthiness for the affected aircraft requiring incorporation of the modified design by December 31, 2014.

SECTION 2: 787-9

I. General

This Data Sheet, which is part of Type Certificate No. IM.A.115, prescribes conditions and limitations under which the product for which the Type Certificate was issued meets the airworthiness requirements of the European Aviation Safety Agency.

1. Type / Model / Variant

787-9

2. Performance Class

A

3. Certifying Authority

Federal Aviation Administration (FAA)
Seattle Aircraft Certification Office
1601 Lind Avenue S.W.
Renton, WA 98055-4056
United States of America

4. Manufacturer

The Boeing Company
1301 Second Avenue
Seattle, WA 98101
United States of America

5. FAA Certification Application Date

July 5, 2009

6. EASA Validation Application Date

July 18, 2011

7. FAA Type Certification Date

June 13, 2014

8. EASA Type Validation Date

June 13, 2014

II. Certification Basis

1. **Reference Date for determining the applicable requirements** July 5, 2009

2. **FAA Type Certification Data Sheet No.** T00021SE

3. **FAA Certification Basis**
July 5, 2009

4. EASA Airworthiness Requirements

EASA Certification Specification 25, Amendment 5, effective as of September 5, 2008 except where identified below.

Certification Specification All Weather Operations (CS AWO), Book 1 and 2 published October 17, 2003.

Reversion:

The following reversions (exceptions) as defined by the respective 787-9 CRIs, have been identified and accepted as part of the EASA Validation of the Boeing 787-9 and are requested by Boeing and agreed by EASA for the certification basis for the validation of the Boeing 787-9:

CS Section	Title or subparagraph	Amendment Reversion		System/Area
		From	To	
25.125	Landing			
	25.125(b)(2)(ii)(B)	5	1	787-9 Airplane
25.611	Accessibility Provisions			
	25.611	5	1	Flight Controls / MCP hardware
				Pilot Controls (except for the flap lever)
				FCE cabinets, PCM, FCE battery, DMRS, GSS, MSA
				IB Slat skew sensor, OB slat skew detection mechanism assembly, LE Slat position sensor
Aileron & Flaperon REUs, Spoiler REU, Spoiler surface position resolver, Spoiler & Stab trim actuator EMCU				
25.611	5	1	Flight Deck/ Flight Deck Linings and Consoles, Crew Oxygen Mask , FD Seats, Enhance Security Flight Deck Door & Bulkhead	
25.611(b)	5	1	Hydraulics/All Hyd electrical component interfaces	
25.729	Retracting Mechanism			
	25.729(e)(1)	5	1	LGA/NWS / Nose Wheel Steering and LG Actuation System except MLG Retract Actuator, MLG Door Actuator, MLG Door Uplock, MLG Door Prox Mech

CS Section	Title or subparagraph	Amendment Reversion		System/Area
		From	To	
25.745	Nose -wheel Steering			
	25.745(c)	5	1	Nose Wheel Steering System
25.783	Fuselage Doors			
	25.783	5	1	Doors/ Fwd and Aft Large Cargo, Aft EE Access, and Bulk Cargo Door Mechanisms/Systems, Fwd Access and Fwd EE Access Doors, Passenger Entry and Crew Emergency Exit Doors
	25.783	5	1	DCA/ Adaptive Flight (Head Down) Display Unit, Heads Up Guidance Projector, Heads Up Guidance Combiner, Display Control Panel, Remote Light Sensor, Multi Function Keypad, Graphic Generator Module, Cursor Control Device
25.809	Emergency Exit Arrangement			
	25.809	5	1	Doors/Passenger Entry and Crew Emergency Exit Doors
25.810	Emergency egress assist means and escape routes			
	25.810	5	1	Doors/Passenger Entry and Crew Emergency Exit Doors
25.858	Cargo or baggage compartment smoke or fire detection systems			
	25.858	5	1	DCA/ Adaptive Flight (Head Down) Display Unit, Heads Up Guidance Projector, Heads Up Guidance Combiner, Display Control Panel, Remote Light Sensor, Multi Function Keypad, Graphic Generator Module, Cursor Control Device
25.869	Fire protection: systems			
	25.869	5	1	Air Data System/ ADMs, AOASs, TAT Probe, Static Ports, Pitot Probes.
	25.869	5	1	Common Core System/ RDC, ACS, ARS, FOX, GPM, PCM, Cabinet
	25.869	5	1	Integrated Surveillance System/ISSPU, ATP, TCAS Antenna, WXR Drive Unit, Receiver Transmitter Module, Flat Plate Antenna
	25.869	5	1	DCA/ Adaptive Flight (Head Down) Display Unit, Heads Up Guidance Projector, Heads Up Guidance Combiner, Display Control Panel, Remote Light Sensor, Multi Function Keypad, Graphic Generator Module, Cursor Control Device
	25.869	5	1	EFB/EU and DU
	25.869	5	1	Flight Deck Audio/ACP, AGU
	25.869	5	1	Recorder System/EAFR
	25.869	5	1	SATCOM/SRT, DLNA, HGA
	25.869	5	1	Comm Radios/VHF Txcvr, HF Txcvr, TCP, VHF antenna

CS Section	Title or subparagraph	Amendment Reversion		System/Area
		From	To	
	25.869	5	1	Crew Information System/Flight Deck Printer, Wireless LAN Unit, Wireless LAN Unit External Antenna, Wireless LAN Unit Internal Antenna
	25.869	5	1	Core Network/Modular Chassis Assembly (MCA), Network Interface Module (NIM), Ethernet Gateway Module (EGM), Controller Server Module (CSM) File Server Module (FSM), Crew Information System (CIS) / Maintenance System (MS) File Server Module (FSM), Air Blocking Module (ABM)
	25.869	5	1	Exterior Lighting
	25.869	5	1	Flight Deck Seats
	25.869	5	1	Flight Deck Control Panels (except 413000 and 413200)
	25.869(a)(2)(3)	5	1	Hydraulics/All Hydraulic electrical component interfaces
25.1203	Fire-detector system			
	25.1203	5	1	DCA/ Adaptive Flight (Head Down) Display Unit, Heads Up Guidance Projector, Heads Up Guidance Combiner, Display Control Panel, Remote Light Sensor, Multi Function Keypad, Graphic Generator Module, Cursor Control Device
25.1302	Installed systems and equipment for use by the flight crew			
	25.1302	5	Note 1	Flight Deck – Applicable Installed Systems and Equipment for use by the flight crew
25.1329	Flight Guidance System			
	25.1329	5	1	DCA/ Adaptive Flight (Head Down) Display Unit, Heads Up Guidance Projector, Heads Up Guidance Combiner, Display Control Panel, Remote Light Sensor, Multi Function Keypad, Graphic Generator Module, Cursor Control Device
	25.1329	5	1	Flight Controls/ MCP hardware Control wheel, column and rudder pedal autopilot back drive actuators
25.1353	Electrical equipment and installations			
	25.1353	5	1	Air Data System/ ADMs, AOASs, TAT Probe, Static Ports, Pitot Probes.
	25.1353	5	1	Common Core System, RDC, ACS, ARS, FIX, GPM, PCM, Cabinet
	25.1353	5	1	ADF Receiver(ADF),DME Transceiver(DME), INR Receiver(INR), Glide Slope Antenna, GNSS Antenna, Localizer Antenna, Marker Beacon Antenna, VOR Antenna, DME Antenna,

CS Section	Title or subparagraph	Amendment Reversion		System/Area
		From	To	
				ADF Antenna, ELT Antenna, ELT Transmitter, ELT AIM
	25.1353	5	1	DCA/ Adaptive Flight (Head Down) Display Unit, Heads Up Guidance Projector, Heads Up Guidance Combiner, Display Control Panel, Remote Light Sensor, Multi Function Keypad, Graphic Generator Module, Cursor Control Device
	25.1353	5	1	Proximity Sensing System / EPAS Module, PSDC, MEDC
	25.1353	5	1	Exterior Lighting
	25.1353	5	1	Flight Controls / ISFD except SSEC Table, MCP hardware, Pilot Controls (except for the flap lever)
				FCE cabinets, PCM, FCE battery, DMRS, GSS, MSA, IB Slat skew sensor, OB slat skew detection mechanism assembly, LE Slat position sensor, Aileron & Flaperon REUs, Spoiler REU, Spoiler surface position resolver, Spoiler & Stab trim actuator EMCU
	25.1353	5	1	Flight Deck Seats
	25.1353	5	1	Hydraulics/All Hyd electrical component interfaces
	25.1353(a)	5	1	Brake System Control Unit, Main and Nose Landing Gear Axle Remote Data Concentrators, Electric Brake Actuator Controller
	25.1353(a)	5	1	LGA/NWS / Nose Wheel Steering and LG Actuation System except MLG Retract Actuator, MLG Door Actuator, MLG Door Uplock, MLG Door Prox Mech
25.1357	Circuit protective devices			
	25.1357	5	1	Air Data System/ ADMs, AOASs, TAT Probe, Static Ports, Pitot Probes.
	25.1357	5	1	ADF Receiver(ADF),DME Transceiver(DME), INR Receiver(INR), Glide Slope Antenna, GNSS Antenna, Localizer Antenna, Marker Beacon Antenna, VOR Antenna, DME Antenna, ADF Antenna, ELT Antenna, ELT Transmitter, ELT AIM
	25.1357	5	1	Integrated Surveillance System/ISSPU, ATP, TCAS Antenna, WXR Drive Unit, Receiver Transmitter Module, Flat Plate Antenna

CS Section	Title or subparagraph	Amendment Reversion		System/Area
		From	To	
	25.1357	5	1	DCA/ Adaptive Flight (Head Down) Display Unit, Heads Up Guidance Projector, Heads Up Guidance Combiner, Display Control Panel, Remote Light Sensor, Multi Function Keypad, Graphic Generator Module, Cursor Control Device
	25.1357	5	1	EFB / EU and DU
	25.1357	5	1	Flight Deck Audio/ACP, AGU
	25.1357	5	1	Recorder System/EAFR
	25.1357	5	1	SATCOM/SRT, DLNA, HGA
	25.1357	5	1	Comm Radios/VHF Txcvr, HF Txcvr, TCP, VHF antenna
	25.1357	5	1	Crew Information System/Flight Deck Printer, Wireless LAN Unit, Wireless LAN Unit External Antenna, Wireless LAN Unit Internal Antenna
	25.1357	5	1	Core Network/Modular Chassis Assembly (MCA), Network Interface Module (NIM), Ethernet Gateway Module (EGM), Controller Server Module (CSM) File Server Module (FSM), Crew Information System (CIS) / Maintenance System (MS) File Server Module (FSM), Air Blocking Module (ABM)
	25.1357	5	1	Flight Controls / ISFD except SSEC Table, MCP hardware, Pilot Controls (except for the flap lever) FCE cabinets, PCM, FCE battery, DMRS, GSS, MSA, IB Slat skew sensor, OB slat skew detection mechanism assembly, LE Slat position sensor, Aileron & Flaperon REUs, Spoiler REU, Spoiler surface position resolver, Spoiler & Stab trim actuator EMCU
	25.1357	5	1	Flight Deck Seats
	25.1357	5	1	Enhance Security Flight Deck Door & Bulkhead
	25.1357(d)(f)	5	1	Hydraulics/All Hydraulic electrical component interfaces
25.1411	General			
	25.1411	5	1	Flight Deck Seats
25.1435	Hydraulic Systems			
	25.1435(b)(2)	5	1	Nose Wheel Steering and LG Actuation System except MLG Retract Actuator, MLG Door Actuator, MLG Door Uplock, MLG Door Prox Mech

Note 1: Use of Special Condition CRI B-11 as for the 787-8 Certification Basis.

5. Special Conditions

<u>CRI</u>	<u>Subject</u>
B-05	Control Surface Position Awareness
B-11	Human Factors
C-01	Crashworthiness of Composite Structure
C-02	Design Manoeuvre Requirements
C-04	Engine and APU Load Conditions
C-13	Tyre / Wheel Debris – Fuel Tank Penetration
D-03	High Altitude Operation / High Cabin Heat Load
D-03-9	Single Side Facing Seats
D-04-9	Seats with Inflatable Restraints
D-09	Type C Passenger Exits
D-12	Fuselage Doors
D-15	Post-Crash Fire Resistance of Composite Material
D-16	In-Flight Fire Resistance of Composite Material
D-22	Crew Rest Compartment (Non-TT&L) and Flight Crew Rest Compartment (TT&L)
D-23	Application of Seat Release and Smoke Emission Requirements to Seat Installations
E-03	Engine and APU Intake Icing – Falling and Blowing Snow
E-07	Flammability Reduction System (Nitrogen Generation System)
E-11	Composite Wing and Fuel Tank Fire Protection
E-14	Fuel Quantity Indicating System
F-01-9	Data Link - Services for the Single European Sky
F-02-9	Flight Recorders including Data Link Recording
F-03	Protection from External High Intensity Radiated Fields (HIRF)
F-22	Isolation or Protection of Aircraft Control Domain and Airline Information Services Domain from the Passenger Information and Entertainment Services Domain
F-24	Lithium-Ion Batteries
F-25	Aircraft System Security for the Aircraft Control Domain and Airline Information Services Domain from Internet and Operator Network Access and Electronic Transmission of Field-Loadable Software Applications and Databases

6. Exemptions

N/A

7. Deviations

<u>CRI</u>	<u>Subject</u>
B-07	Cockpit Controls

8. Equivalent Safety Findings

The following table lists the Equivalent Safety Finding requests made by Boeing to the 787-9 model.

<u>CRI</u>	<u>Subject</u>
B-01-9	Standby Air Data System
B-02-9	En route Climb
B-06	Trim Systems
B-09	Out of Trim Characteristics
C-03	Dive Speed Definition, with Speed Protection System.
D-05-9	Krueger Flaps
D-08	Flight Control System Failures
D-17	Lighted "No Smoking" Signs in lieu of Placards
D-18	Emergency Exit Door Arrow and "OPEN" Colour
D-25	Crew Determination of Quantity of Oxygen in Passenger Oxygen System
D-28	Door Indications
E-04	Thrust Reverser Testing
E-05	Hydraulics Bay in Aft Strut Fairing
E-09	GENx Cowl TAI Duct
E-12	Ignition Switches
E-17	RR Turbine Overheat Detection
E-22	B787/GE Equivalent Safety Finding (ESF) for § 25.1181(a)(6) & § 25.1182(a) for the GENx-1B Fan Case Compartment and § 25.1183(a) for the Power Door Opening System (PDOS)
E-24	GENx – Fuel Filtration System
F-14	Use of Earth Reference System (ERS) accelerometers in lieu of the CG mounted Flight Data Recorder Accelerometers
F-18	Minimum Mass Flow of Supplemental Oxygen
F-27	Instrument Systems
F-30	First Aid Portable Pulse Oxygen System
G-04	Fire Switch Handle Design
G-02-10	Green Arc for Powerplant Instruments*
G-GEN1	ICA

*Considered from approval ref 10063714

The following table lists those subjects where Boeing has requested continued use of Equivalent Safety Finding CRIs previously agreed by JAA on earlier Boeing programmes. These have been reviewed by the EASA 787 team for their suitability, based on consideration of similarity of design, requirements and any relevant policy/guidance material. All of these ESFs are considered to be non-controversial.

<u>CRI</u>	<u>Subject</u>
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757 D-05	Passenger Information Signs (Hard-Wired No-Smoking Signs)
777 D-LR-6	Door Sill Reflectance
777 F-LR-3	Exterior Exit Markings
777 F-LR-4	Pneumatic Systems – High Pressure, escape slide cylinders and associated piping.
777 F-9	Access to Oxygen Dispensing Units in Galley/Work Areas
777 F-12	Non-unique Overspeed Aural Warning
777 F-LR-1	Dedicated Reset Switch, Overspeed Warning

9. Elect to Comply

CS-25 Amendment 9 for the following certification specifications pertaining to Security Considerations:

<u>CS</u>	<u>Subject</u>
25.795(a)	Protection of flightdeck
25.795(b)(2)	Passenger cabin smoke protection
25.795(b)(3)	Cargo compartment fire suppression
25.795(c)(1)	Least risk bomb location
25.795(c)(3)(ii)	Toilets
25.795(c)(3)(iii)	Life preservers

CS-25 Amendment 10 for the following certification specifications

<u>CS</u>	<u>Subject</u>
25.1535	ETOPS Design approval

Additionally, for the aircraft having embodied the modification and approval related to the *Major Change Approval ref 10057983 "Model 787 - Automatic Dependent Surveillance – Broadcast (ADS-B in and Out) new functionality"*, Boeing elect to comply with:

CS-ACNS, Initial Issue, dated 17 December 2013, Book 1, Subpart D -- Surveillance, Sections: 1, 2, 3, 4

10. Environmental Protection Standards

Boeing has elected to comply with:

ICAO Annex 16, Volume I, Amendment 9 (Fifth Edition), Chapter 4 for Noise; and ICAO Annex 16, Volume II (Third Edition), Amendment 7, for Emissions.

For details of the certified noise levels see TCDSN EASA.IM.A.115.

III. Technical Characteristics and Operational Limitations

1. Type Design Definition

787-9: D061Z022-04, Revision B, dated May 27, 2014

2. Description

Twin turbo-fan, twin-aisle, long range, large aeroplane.

3. Equipment

The basic required equipment as prescribed in the applicable airworthiness regulations (see Certification Basis) must be installed in the aircraft for certification.

4. Dimensions

Wingspan	60.1218 meters	[197 feet, 3 inches]
Fuselage Length	62.0014 meters	[203 feet, 5 inch]
Fuselage Constant Diameter	5.7531 meters	[18 feet, 10.5 inches]

5. Engines

Two (2) Rolls-Royce plc Turbofan Engines: (EASA Engine Type Certificate No. E.036)
Models: Trent 1000-J2, Trent 1000-A2, Trent 1000-K2, Trent 1000-D2, Trent 1000-AE3, Trent 1000-D3, Trent 1000-J3, or Trent 1000-K3

Two (2) General Electric Engines: (EASA Engine Type Certificate No. E.102)
Models: GEnx-1B74/75/P2, GEnx-1B67/P2, GEnx-1B70/75/P2, GEnx-1B70, GEnx-1B70/P1, GEnx-1B70/P2, GEnx-1B74/75/P1

Engine Limits:

	Static thrust at sea level:	
RB211 Trent 1000-J2	347.5 kN (78,129 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
RB211 Trent 1000-A2	307.8 kN (69,194 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
RB211 Trent 1000-K2	347.5 kN (78,129 lbf)	Takeoff (5 min)* (flat rated to 33 deg C)
RB211 Trent 1000-D2	331.4 kN (74,511 lbf)	Takeoff (5 min)* (flat rated to 35 deg C)
RB211 Trent 1000-AE3	307.8 kN (69,194 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
RB211 Trent 1000-D3	331.4 kN (74,511 lbf)	Takeoff (5 min)* (flat rated to 35 deg C)
RB211 Trent 1000-J3	347.5 kN (78,129 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
RB211 Trent 1000-K3	347.5 kN (78,129 lbf)	Takeoff (5 min)* (flat rated to 33 deg C)
GEnx-1B74/75P2 applicable to Bill of Material GEnx-1B74/75/P2G01 or GEnx-1B74/75/P2G02	341.2 kN (76,700 lbf)	Takeoff (5 min)* (flat rated to 31.7 deg C)
GEnx-1B74/75P1 applicable to Bill of Material GEnx-1B74/75/P1G01	341.2 kN (76,700 lbf)	Takeoff (5 min)* (flat rated to 31.7 deg C)
GEnx-1B67/P2	308.7 kN (69,400 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)

GEnx-1B70/75/P2	321.6 kN (72,300 lbf)	Takeoff (5 min)* (flat rated to 38.8 deg C)
GEnx-1B70 applicable to Bill of Material GEnx-1B70G03 and GEnx-1B70G04	321.6 kN (72,300 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
GEnx-1B70/P1 applicable to Bill of Material GEnx-1B70/P1G01	321.6 kN (72,300 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)
GEnx-1B70/P2 applicable to Bill of Material GEnx-1B70/P2G01 or GEnx-1B70/P2G02	321.6 kN (72,300 lbf)	Takeoff (5 min)* (flat rated to 30 deg C)

* 10 minutes at takeoff thrust allowed only in case of engine failure

Other engine limitations: See the relevant Engine Type Certificate Data Sheet.

6. Auxiliary Power Unit

One (1) no bleed-air APU, Hamilton Sundstrand APS5000

Limitations and Operating Procedures - See the appropriate EASA approved Airplane Flight Manual (See SECTION 2 Paragraph **IV** Sub-paragraph 1.)

7. Propellers

N/A

8. Fluids (Fuel, Oil, Additives, Hydraulics)

Fuels: Rolls-Royce plc Turbofan Engines*

Nomenclature	Specification	
	U.S.A.	RUSSIA
KEROSENE	ASTM D-1655 grades Jet-A and Jet A-1	
	MIL-DTL-83133 grade JP-8	
		GOST 10227-86 grade TS-1
High Flash Point	MIL-DTL-5624 grade JP-5	

Fuels: General Electric Turbofan Engines*

Nomenclature	Specification	
	U.S.A.	RUSSIA
KEROSENE	ASTM D-1655 grades Jet-A and Jet A-1	
	MIL-DTL-83133 grade JP-8	
		GOST 10227-86 grade TS-1
High Flash Point	MIL-DTL-5624 grade JP-5	

* Fuels conforming to the specifications in the table are acceptable. Fuels produced to other specifications and having properties meeting the requirements of the above specifications are acceptable for use (refer to applicable approved Manuals). The fuel and any fuel additives must conform to the relevant Engine Operating Instructions.

See the appropriate EASA approved Airplane Flight Manual
(See SECTION 2 Paragraph IV Sub-paragraph 1)

Oils

Oils: Refer to applicable associated Manuals.

Hydraulics

Hydraulic Fluids: ExxonMobil HyJet V per BMS3-11 Type V Grade C only

9. Fluid Capacities

Tanks	Usable Fuel			
	U.S. Gallons	Pounds*	Liters	Kilograms*
Main L or R	5,520	36,984	20,895	16,716
Center	22,340	149,678	84,566	67,653
Total	33,380	223,646	126,356	101,085

	Unusable Fuel			
	U.S. Gallons	Pounds*	Liters	Kilograms*
Drainable	43.0	288.1	162.7	130.2
Trapped	30.2	202.3	114.2	91.4
Total	73.2	490.4	276.9	221.6

* Fuel Density is 6.7 Pounds / U.S. Gallon and 0.8 Kilograms / Liter

See appropriate Weights and Balance Manual
(See SECTION 2 Paragraph IV Sub-paragraph 3)

10. Airspeed Limits

$V_{MO}/M_{MO} = 350\text{KEAS} / 0.90\text{M}$.

For other airspeed limits, see the appropriate EASA approved Airplane Flight Manual
(See SECTION 2 Paragraph IV Sub-paragraph 1)

11. Flight Envelope

Maximum Operating Altitude: 43,100 feet

See the appropriate EASA approved Airplane Flight Manual
(See SECTION 2 Paragraph IV Sub-paragraph 1)

12. Operating Limitations

See the appropriate EASA approved Airplane Flight Manual
(See SECTION 2 Paragraph IV Sub-paragraph 1)

12.1 Approved Operations

The airplane is approved for the following kinds of flight and operation, both day and night, provided the required equipment is installed and approved in accordance with the applicable regulations/specifications:

- Visual (VFR)
- Instrument (IFR)
- Icing Conditions
- Low weather minima (CAT I, II, III operations)
- RVSM
- B-RNAV
- Gear down dispatch
- Towbarless Towing
- Wet and contaminated runway operations
- Extended Over-Water

All Weather Capability

The aircraft is qualified to Cat III precision approach and autoland.

12.2 Other Limitations

Operational Limits

Runway slope – $\pm 2\%$

Maximum Takeoff and Landing Tailwind Component – 15 knots*
Maximum Operating Altitude – 43,100 feet pressure altitude

* The capability of the airplane has been satisfactorily demonstrated for takeoff and manual and automatic landings with tailwinds up to 15 knots. This finding does not constitute operational approval to conduct takeoffs and landings with tailwind components in excess of 10 knots.

13. Maximum Certified Masses

Maximum Taxi Weight*	Maximum Takeoff Weight*	Maximum Landing Weight	Maximum Zero Fuel Weight	Minimum Flight and Zero Fuel Weight
<u>561,500 LB</u>	<u>560,000 LB</u>	425,000 LB	400,000 LB	244,000 LB
<u>254,692 KG</u>	<u>254,011 KG</u>	192,776 KG	181,436 KG	110,677 KG

*Type design MTW & MTOW increase with EASA approval 10062589

Notes: The maximum weight limits may be less as limited by center of gravity, fuel density and fuel loading limits, as given in the EASA approved Airplane Flight Manual (See Section IV para. 1). Refer to the Weight and Balance Manual (See Section IV para. 3) for additional specific airplane loading limitations.

The Minimum Flight Weight does not include usable fuel.

See the appropriate EASA approved Airplane Flight Manual
(See SECTION 2 Paragraph IV Sub-paragraph 1)

14. Centre of Gravity Range

See the appropriate EASA approved Airplane Flight Manual
(See SECTION 2 Paragraph IV Sub-paragraph 1)

15. Datum

Station 0.0, located 1.41732 meters [55.8 inches] forward of airplane nose (B.S. 55.8).

16. Mean Aerodynamic Chord (MAC)

6.27126 meters [246.9 inches]

17. Levelling Means

A plumb bob attachment and levelling provision scale are provided in the left main gear wheel well.

18. Minimum Flight Crew

Two (2): Pilot and co-pilot

19. Minimum Cabin Crew

The table below provides the certified Maximum Passenger Seating Capacities (MPS), the corresponding cabin configuration (exit arrangement and modifications) and the associated numbers of cabin crew members used to demonstrate compliance with the evacuation certification requirements of CS 25.803. Additional cabin crew members may be required to comply with other regulatory requirements (e.g., cabin attendant direct view).

Passenger Seating Capacity & Cabin Configuration	Cabin crew
420 passengers: (A, A, A, A) exit arrangement	9
400 passengers: (A, A, A, A) exit arrangement	8
355 passengers: (C, A, A, A) exit arrangement	8
355 passengers: (A, A, C, A) exit arrangement	8
350 passengers: (A, A, C, A) exit arrangement	7
300 passengers: (C, A, C, A) exit arrangement	6

20. Maximum Seating Capacity

The maximum number of passengers approved for emergency evacuation taking into account the introduction of Type C emergency exits in EASA Type Certification Basis via 787 Special Condition CRI D-09 is:

- 420 with four pairs of exit in an (A, A, A, A) exit arrangement
- 355 with four pairs of exit in an (C, A, A, A) exit arrangement
- 355 with four pairs of exit in an (A, A, C, A) exit arrangement
- 300 with four pairs of exit in an (C, A, C, A) exit arrangement

Maximum passenger capacity may be further limited by Environmental Control System ventilation per occupant as defined in CS 25.831(a) as amended by EASA 787 Special Condition CRI D-03.

21. Baggage/ Cargo Compartment

Cargo Compartment	Maximum Load	
	Pounds	Kilograms
Forward	70,560	32,005
Aft	56,560	25,655
Bulk	6,030	2,735

See appropriate Weight and Balance Manual, Boeing Document D043Z590-aaaa (where aaaa is the owner identifier).

(See SECTION 2 Paragraph IV Sub-paragraph 3)

22. Wheels and Tyres

Nose Assy (Qty 2)

Tyre: 40x16.0R16

Wheel: S685Z001-390 or -590

Main Assy (Qty 8)

Tyre: 50x21.0R22

Wheel: S685Z001-360 or -561

23. ETOPS

The 787-9 has been evaluated in accordance with the type design requirements of CS 25.1535 and found suitable to 330-minute ETOPS operations when operated and maintained in accordance with Boeing Document No. D021Z002-01, "Model 787 ETOPS

Configuration, Maintenance, and Procedures.” This finding does not constitute approval to conduct ETOPS operations.

IV. Operating and Service Instructions

1. Airplane Flight Manual (AFM)

Boeing Document D631Z003

2. Instructions for Continued Airworthiness and Airworthiness Limitations

Boeing Document D011Z009-02	787 Maintenance Review Board Document (MRBR)
Boeing Document D011Z009-03	Maintenance Planning Document (MPD)
Boeing Document D011Z009-03-01	Airworthiness Limitations (AWLs)
Boeing Document D011Z009-03-02	Line Number Specific Airworthiness Limitations (AWLs)
Boeing Document D011Z009-03-03	Certification Maintenance Requirements (CMRs)
Boeing Document D011Z009-03-04	Special Compliance Items (SCIs)
Boeing Document D021Z002-01	787 ETOPS Configuration, Maintenance and Procedures (CMP)

3. Weight and Balance Manual (WBM)

Boeing Document D043Z590-aaaa-xxxxx (Note 1)

Note 1 .A current weight and balance report, including a list of equipment included in the certificated empty weight and loading instructions when necessary, must be provided for each aircraft at the time of original certification. (aaaa is the owner identifier and xxxxx is the aircraft serial number)

Note 2 Airplane operation must be in accordance with the EASA approved Airplane Flight Manual, Boeing Document D631Z003. All placards required by either the EASA approved Flight Manual, the applicable operating rules, or the Certification Basis must be installed in the airplane.

V. Operational Suitability Data (OSD)

The Operational Suitability Data elements listed below are approved by the European Aviation Safety Agency under the EASA Type Certificate IM.A.115 as per Commission Regulation (EU) 748/2012 as amended by Commission Regulation (EU) No 69/2014.

1. Master Minimum Equipment List

- a. Master Minimum Equipment List (MMEL reference D630Z004-02) approved at revision 9, dated on 30 September 2015 (or later approved revisions) as per the defined Operational Suitability Data Certification Basis : JAR-MMEL / MEL, section 1 Subpart A & B
- b. Required for entry into service by EU operator.

2. Flight Crew Data

- a. The Flight Crew data (FCD reference D015Z033-01) approved at Revision New, dated on 10 December 2015 (or later approved revisions) as per the defined Operational Suitability Data Certification Basis : CS-FCD, initial Issue.
- b. Required for entry into service by EU operator.
- c. Pilot Type Rating: "B777/787".
Note: These data cover the models B787-8, -9 and B777-200, -300 and -777F series aircraft. Differences are addressed in D015Z033-01.

3. Cabin Crew Data

- a. The Cabin Crew data (CCD reference D6-85797, Operational Suitability Data-Cabin Crew Data - Boeing 777/787) approved at revision A, dated on 1st August 2015 (or later approved revisions) as per the defined Operational Suitability Data Certification Basis : CS-CCD, Initial Issue.
- b. Required for entry into service by EU operator.
- c. The B787-8 and B787-9 models are determined to be the same aircraft type for Cabin Crew. The B787-8/-9 aircraft models are determined to be variants, in terms of Cabin Crew, to the B777 (B777-200 / -200ER / -200LR / -300 / -300ER) aircraft model(s).

VI. Notes

Reserved.

SECTION: ADMINISTRATIVE

I. Acronyms and Abbreviations

A/C	Aircraft
AFM	Airplane Flight Manual
AMC	Acceptable Means of Compliance
APU	Auxiliary Power Unit
CG	Center of Gravity
CRI	Certification Review Item
EASA	European Aviation Safety Agency
EU	European Union
EWIS	Enhanced Wiring Interconnection System
FAA	Federal Aviation Administration
ICA	Instructions for Continued Airworthiness
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
JAA	Joint Aviation Authorities
NPA	Notice of Proposed Amendment
RR	Rolls-Royce
RVSM	Reduced Vertical Separation Minima
TCDS	Type Certificate Data Sheet
TCDSN	Type Certificate Data Sheet for Noise
VFR	Visual Flight Rules

II. Type Certificate Holder Record

The Boeing Company
1901 Oakesdale Ave SW
Renton, WA 98057-2623
United States of America

III. Change Record

Issue	Date	Changes	TC issue
Issue 01	26 Aug 2011	Initial Issue for Model 787-8	Initial Issue, 26 August 2011
Issue 02	30 Mar 2012	Update of FAA B787-8 TCDS reference Revision of Type Certification Basis incorporate new CRIs Introduction of Maximum Seating Capacity Addition of Trent 1000-C, GEnx-1B64 and GEnx-1B70 Engine models	26 August 2011
Issue 03	10 May 2012	Removal of 8,000ft Take-off and landing in § 12.2	26 August 2011
Issue 04	05 Nov 2012	Update of Type Certificate Holder Address Revised Certified Engine Types adding Trent 1000-E and removing Trent 1000-C Revision of Maximum Certified Masses Revision of Section V Note 2, 3, and 5 text	26 August 2011
Issue 05	15 May 2013	Revised Certified Engine Types adding GEnx-1B64/P1 , GEnx-1B67, GEnx-1B67/P1, GEnx-1B70, GEnx-1B70/P1, and GEnx-1B70/75/P1 Revised Section V Note revising note 4 and adding notes 5 through 10	26 August 2011
Issue 06	14 Jun 2013	Revised Certified Engine Types adding Trent 1000-C and Trent 1000-G Revised CRI E-23 expiration date to December 31, 2013 Revised Section V Note revising note 3	26 August 2011
Issue 07	07 Nov 2013	CRI E-23 removed based upon acceptable compliance finding to CRI E-14	26 August 2011
Issue 08	13 June 2014	The Boeing Company Address revised SECTION 1: Certified Engine Types added: GEnx-1B64/P2, GEnx-1B67/P2, GEnx-1B70/P2, and GEnx-1B70/75/P2 II, 7 :Update of the time limited deviation notes V Notes 2 through 10 deleted. (Bill of Material integrated within engine limit tables) SECTION 2: 787-9 added	Issue 2, 13 June 2014
Issue 09	04 July 2014	Update of the time limited deviation of CRI E-20 & CRI E-21 for 787-8	Issue 2, 13 June 2014
Issue 10	30 Sept 2014	SECTION 1: 787-8 Upgrade ICAO Annex 16, Vol. II : Amendment 7 Certified Engine Types, - Ratings added: RR Trent 1000-A2, -C2, -D, -G2, -H, -H2 ETOPS beyond 180 minutes	Issue 2, 13 June 2014

		Chapter V Operational Suitability Data added SECTION 2: 787-9 Upgrade ICAO Annex 16, Vol. II : Amendment 7 Certified Engine Types, - Ratings and Fuel Specifications added: RR Trent 1000-A2, -K2 and GENx-1B74/75/P2 Special Conditions and Equivalent Safety Findings added. (Cabin related and for GENx) Chapter V Operational Suitability Data added	
Issue 11	02 Oct 2014	SECTION 2: 787-9 Maximum Seating Capacity revised.	Issue 2, 13 June 2014
Issue 12	15 April 2015	Revised Certified Engine Types adding Trent 1000-D2 for 787-8, Chapter III section 5.	Issue 2, 13 June 2014
Issue 13	17 Dec. 2015	Added Minimum Cabin Crew, Sections 1 (787-8) & 2 (787-9), Chapter III, subsection 19, with associated renumbering of the subsequence subsections accordingly. Added OPERATIONAL SUITABILITY DATA (OSD), Sections 1 (787-8) & 2 (787-9), Chapter V.	Issue 2, 13 June 2014
Issue 14	10 May 2016	SECTION 1 (787-8): Added CS-ACNS elect-to-comply (for ADS-B In and Out) SECTION 2 (787-9): Correction Static thrust at sea level for GENx-1B74/75P2 (Engines) Added GENx-1B67/P2 and GENx-1B70/75/P2 engine models. Added CS-ACNS elect-to-comply (for ADS-B In and Out)	Issue 2, 13 June 2014
Issue 15	17 June 2016	Revised Certified Engine Types, adding for 787-9 : GENx-1B70, GENx-1B70/P1, GENx-1B70/P2 (Section 2 : 787-9, III, 5)	Issue 2, 13 June 2014
Issue 16	14 Nov. 2016	Introduction of Trent 1000-D trust rating on the 787-9. Addition of GENx-1B74/75/P1 for the 787-9 Editorial Revision of the Certified Engine Types list for the 787-8 and Trent 1000-D (in line with the associated table) Update of Minimum Cabin Crew.	Issue 2, 13 June 2014
Issue 17	28 April 2017	Revised Certified Engine Types, adding for 787-8 : Rolls-Royce Trent 1000-L2 (Section 1 : 787-8, III, 5)	Issue 2, 13 June 2014
Issue 18	13 July 2017	Section 2 787-9, III Technical Characteristics and Operations Limitations, 13 Maximum Certified Masses: MTW & MTOW values are increased thanks to approval 10062589.	Issue 2, 13 June 2014
Issue 19	16 Nov. 2017	For 787-8 : Introduction of Trent 1000-AE3, Trent 1000-CE3, Trent 1000-D3, Trent 1000-G3, and Trent 1000-H3	Issue 2, 13 June 2014

		For 787-9 : Introduction of Trent 1000-AE3, Trent 1000-D3, Trent 1000-J3, and Trent 1000-K3 For 787-8/-9 : Consideration of ESF G-02-10 - Green Arc for Powerplant Instruments	
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