



European Union 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
787-10

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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 Union Aviation Safety Agency.

1. Type / Model / Variant

787-8

2. Performance Class

A

3. Certifying Authority

Federal Aviation Administration (FAA)
Seattle Aircraft Certification Office
2200 S. 216 Street
Des Moines, WA 98198-6547
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

| <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 |

Post TC :

| | |
|----------|---|
| D-GEN8 | Installation of Oblique Seats, public effectivity from 787 TCDS Iss 23. |
| D-GEN10 | Installation of Suite Type Seating, effective October 31, 2019 |
| F-GEN-11 | Non-rechargeable Lithium Batteries Installations, effective for changes from November 10 th 2016 |

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 |

Post TC :

B-13 Vibration/Buffering Compliance Criteria for Large External Antenna Installation, from 787 TCDS Iss 24.

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> |
|---------------------------------------|---|
| 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 GENx-1B70/75/P2G01 or GENx-1B70/75/P2G02 | 321.6 kN (72,300 lbf) | Takeoff (5 min)* (flat rated to 38.8 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 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 for 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 Union 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 Union Aviation Safety Agency.

1. Type / Model / Variant

787-9

2. Performance Class

A

3. Certifying Authority

Federal Aviation Administration (FAA)
Seattle Aircraft Certification Office
2200 S. 216 Street
Des Moines, WA 98198-6547
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 | 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 |

| CS Section | Title or subparagraph | Amendment Reversion | | System/Area |
|------------|--|---------------------|--------|--|
| | | From | To | |
| | 25.869 | 5 | 1 | SATCOM/SRT, DLNA, HGA |
| | 25.869 | 5 | 1 | Comm Radios/VHF Txcvr, HF Txcvr, TCP, VHF antenna |
| | 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 |

| CS Section | Title or subparagraph | Amendment Reversion | | System/Area |
|------------|----------------------------|---------------------|----|---|
| | | From | To | |
| | 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, 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, |

| CS Section | Title or subparagraph | Amendment Reversion | | System/Area |
|------------|-----------------------|---------------------|----|--|
| | | From | To | |
| | | | | Receiver Transmitter Module, Flat Plate Antenna |
| | 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 |

Post TC :

| | |
|---------|---|
| D-GEN8 | Installation of Oblique Seats, public effectivity from 787 TCDS Iss 23. |
| D-GEN10 | Installation of Suite Type Seating, effective October 31, 2019 |

F-GEN-11 Non-rechargeable Lithium Batteries Installations, effective for changes from November 10th 2016

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> |
|------------|--|
| 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 |

Post TC :

B-13 Vibration/Buffeting Compliance Criteria for Large External Antenna Installation, from 787 TCDS Iss 24.

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

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

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 for 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 Union 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 3: 787-10

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 Union Aviation Safety Agency.

1. Type / Model / Variant

787-10

2. Performance Class

A

3. Certifying Authority

Federal Aviation Administration (FAA)
Seattle Aircraft Certification Office
2200 S. 216 Street
Des Moines, WA 98198-6547
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 12, 2013

6. EASA Validation Application Date

May 20, 2014

7. FAA Type Certification Date

January 19, 2018

8. EASA Type Validation Date

February 28, 2018

II. Certification Basis

1. **Reference Date for determining the applicable requirements** July 12, 2013

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

3. **FAA Certification Basis**
July 12, 2013

4. EASA Airworthiness Requirements

EASA Certification Specification 25, Amendment 13, effective as of June 14, 2013 except where identified below.

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

Reversion:

The following reversions (exceptions) have been identified and accepted as part of the EASA Validation of the Boeing 787-10 and are requested by Boeing and agreed by EASA for the certification basis for the validation of the Boeing 787-10:

| CS Section | Title or subparagraph | Amendment Reversion | | System/Area |
|------------|--------------------------|---------------------|----|---|
| | | From | To | |
| 25.125 | Landing | | | |
| | 25.125(b)(2)(ii)(B) | 13 | 1 | 787-9 Airplane (Aerodynamics) |
| 25.611 | Accessibility Provisions | | | |
| | | 13 | 1 | Flight Controls: All Flight Controls and Autoflight equipment except ACEs, slat electric motor controller, elevator REU, High Lift and Primary Flight Control actuators (changed or affected equipment), and all Empennage Door Actuation System (EDAS) equipment Flight Deck: Flight Deck Linings and Consoles, Crew Oxygen Mask , FD Seats, Enhance Security Flight Deck Door & Bulkhead |
| | 25.611(b) | 13 | 1 | Mech/Hyd: All Hydraulics electrical component interfaces |
| 25.777 | Cockpit controls | | | |
| | | 13 | 1 | Flight Controls: Pilot Controls equipment for Primary and Secondary Flight Controls, High Lift Systems, and ISFD |
| 25.783 | Fuselage Doors | | | |

| CS Section | Title or subparagraph | Amendment Reversion | | System/Area |
|------------|--|---------------------|----|---|
| | | From | To | |
| | | 13 | 1 | Structures – Doors: Fwd and Aft Large Cargo, Aft EE Access, Bulk Cargo Door, Fwd EE Access Doors, Passenger Entry and Crew Emergency Exit Doors |
| 25.795 | Security considerations | | | |
| | 25.795(b)(1) | 13 | 5 | 787-10 Airplane (ECS – Air Distribution) |
| | 25.795(c)(2) | 13 | 5 | 787-10 Airplane (Airplane Safety) |
| | 25.795(c)(3)(i) | 13 | 5 | 787-10 Airplane (Interiors) |
| | The Boeing Model 787-10 was granted an exception for CS 25.795(b)(1), (c)(2) and (c)(3)(i) based on the demonstration and justification that security features were present in the type design. These security features must be in consideration in any subsequent type design change, modification, or repair, to ensure that the level of safety designed into the 787-10 is maintained. The reference aircraft at initial Amended Type Certificate 787-10 without the cabin interior is serial number 60256. The reference aircraft 787-10 with the cabin interior is serial number 60253. In lieu of the following, compliance to CS 25.795(b)(1), (c)(2) and (c)(3)(i), at amendment 13, may be shown: 'Modifications that reduce flight critical system separation or adversely impact flight deck smoke prevention, system separation and protections for searching above the overhead stowage compartments are not acceptable.' | | | |
| 25.809 | Emergency Exit Arrangement | | | |
| | | 13 | 1 | Structures – Doors (Mechanisms/System): Passenger Entry and Crew Emergency Exit Doors |
| 25.810 | Emergency egress assist means and escape routes | | | |
| | | 13 | 1 | Structures – Doors (Mechanisms/System): Passenger Entry and Crew Emergency Exit Doors |
| 25.853 | Compartment interiors | | | |
| | 25.853(a) | 13 | 5 | Flight Controls: Pilot Controls, MCP, EDAS control and monitoring unit |
| 25.869 | Fire protection: systems | | | |
| | | 13 | 1 | Avionics: Air Data System/ ADMs, AOASs, TAT Probe, Static Ports, Pitot Probes, Common Core System/ RDC, ACS, ARS, FOX, GPM, PCM, Cabinet 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 | |
| | | | | 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 EFB/EU and DU Flight Deck Audio/ACP, AGU, Recorder System/EAFR, SATCOM/SRT, DLNA, HGA Comm Radios/VHF Txcvr, HF Txcvr, TCP, VHF antenna |
| | | 13 | 1 | Avionics: Crew Information System/Flight Deck Printer, Wireless LAN Unit, Wireless LAN Unit External Antenna, Wireless LAN Unit Internal Antenna 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) Electrical: Exterior Lighting Flight Deck: Flight Deck Seats, Flight Deck Control Panels (except 413000 and 413200) |
| | 25.869(a)(2)(3) | 13 | 1 | Mech/Hyd: All Hydraulic electrical component interfaces |
| 25.1302 | Installed systems and equipment for use by the flight crew | | | |
| | | 13 | Note 1 | Flight Deck: Applicable Installed Systems and Equipment for use by the flightcrew |
| 25.1353 | Electrical equipment and installations | | | |
| | | 13 | 1 | Avionics: Air Data System/ ADMs, AOASs, TAT Probe, Static Ports, Pitot Probes Common Core System, RDC, ACS, ARS, FIX, GPM, PCM, Cabinet ADF Receiver, DME Transceiver, INR Receiver, Glide Slope Antenna, GNSS Antenna, Localizer Antenna, Marker Beacon Antenna, VOR Antenna, DME Antenna, ADF Antenna, ELT Antenna, ELT Transmitter, ELT AIM |

| CS Section | Title or subparagraph | Amendment Reversion | | System/Area |
|------------|----------------------------|---------------------|----|---|
| | | From | To | |
| | | | | <p>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</p> <p>Electrical: Proximity Sensing System / EPAS Module, PSDC, MEDC, Exterior Lighting</p> <p>Flight Deck: Flight Deck Seats</p> <p>Mech/Hyd: All Hyd electrical component interfaces</p> <p>Flight Controls: All Flight Controls and Autoflight electrical equipment except ISFD, ACEs, slat electric motor controller, elevator REU, High Lift and Primary Flight Control actuators (changed or affected equipment), and all Empennage Door Actuation System (EDAS) electrical equipment</p> |
| | 25.1353(a) | 13 | 1 | <p>Mech/Hyd: Nose Wheel Steering and LG Actuation System except Semi Lever Gear Actuator Hydraulic Pressure Transducer and Gas Pressure/Temperature Transducer</p> |
| 25.1357 | Circuit protective devices | | | |
| | 25.1357 | 13 | 1 | <p>Avionics: Air Data System/ ADMs, AOASs, TAT Probe, Static Ports, Pitot Probes ADF Receiver, DME Transceiver, INR Receiver, Glide Slope Antenna, GNSS Antenna, Localizer Antenna, Marker Beacon Antenna, VOR Antenna, DME Antenna, ADF Antenna, ELT Antenna, ELT Transmitter, ELT AIM Integrated Surveillance System/ISSPU, ATP, TCAS Antenna, WXR Drive Unit, Receiver transmitter module, Flat Plate Antenna</p> <p>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</p> <p>EFB / EU and DU Flight Deck Audio/ACP, AGU Recorder System/EAFR</p> |

| CS Section | Title or subparagraph | Amendment Reversion | | System/Area |
|------------|----------------------------|---------------------|----|---|
| | | From | To | |
| | | | | SATCOM/SRT, DLNA, HGA Comm Radios/VHF Txvtr, HF Txvtr, TCP, VHF antenna Crew Information System/Flight Deck Printer, Wireless LAN Unit, Wireless LAN Unit External Antenna, Wireless LAN Unit Internal Antenna 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) Flight Deck: Flight Deck Seats, Enhance Security Flight Deck Door & Bulkhead Flight Controls: All Flight Controls and Autoflight electrical equipment except ISFD, ACEs, slat electric motor controller, elevator REU, High Lift and Primary Flight Control actuators (changed or affected equipment), and all Empennage Door Actuation System (EDAS) electrical equipment |
| | 25.1357(d)(f) | 13 | 1 | Mech/Hyd: All Hydraulic electrical component interfaces |
| 25.1411 | Safety Equipment : General | | | |
| | | 13 | 1 | Flight Deck : Seats |
| 25.1435 | Hydraulic Systems | | | |
| | 25.1435(b)(2) | 13 | 1 | Mech/Hyd: Nose Wheel Steering and LG Actuation System except Semi Lever Gear Actuator, Tail Skid Actuator, Semi Lever Gear Actuator Hydraulic Pressure Transducer and Gas Pressure/Temperature Transducer, Semi Lever Gear Isolation Valve |

Note 1: Use of Special Condition CRI B-11 as for the 787-9 and 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-13 | Tyre / Wheel Debris – Fuel Tank Penetration |
| D-03-9 | Single Side Facing Seats (Post ATC) |
| D-03-10 | Flaps Up Vertical Modal Suppression System Aeroelastic Stability Requirements |
| D-04-9 | Seats with Inflatable Restraints – Issue 8 (Post ATC) |
| 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) (Post ATC) |
| D-23 | Application of Seat Release and Smoke Emission Requirements to Seat Installations (Post ATC) |
| E-11 | Composite Wing and Fuel Tank Fire Protection |
| 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 |
| F-GEN-11 | Non-rechargeable Lithium Batteries Installations |

Post TC :

| | |
|---------|---|
| D-GEN8 | Installation of Oblique Seats, public effectivity from 787 TCDS Iss 23. |
| D-GEN10 | Installation of Suite Type Seating, effective October 31, 2019 |

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 787-10 model.

| <u>CRI</u> | <u>Subject</u> |
|------------|--|
| 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-01-10 | Burnthrough Protection of Composite Fuselage |
| D-05-9 | Krueger Flaps |
| D-08 | Flight Control System Failures |
| 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-12 | Ignition Switches |
| E-17 | RR Turbine Overheat Detection |
| 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 |

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-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 |

Post TC :

| | |
|------|--|
| B-13 | Vibration/Buffering Compliance Criteria for Large External Antenna Installation, from 787 TCDS Iss 24. |
|------|--|

9. Elect to Comply

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

10. Environmental Protection Standards

Noise : ICAO Annex 16, Volume I (for details see EASA TCDSN EASA.IM.A.115)

Fuel Venting : ICAO Annex 16, Volume II (Third Edition), Amendment 7.

III. Technical Characteristics and Operational Limitations

1. Type Design Definition

787-10: D061Z114-01, Revision B, January 17, 2018

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 | 68.3007 meters | [224 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-J3

Two (2) General Electric Engines: (EASA Engine Type Certificate No. E.102) Models:
GEnx-1B76/P2, GEnx-1B76A/P2

Engine Limits:

| | Static thrust at sea level: | |
|--|--------------------------------|--|
| RB211 Trent 1000-J3 | 347.5 kN (78,129 lbf) | Takeoff (5 min)* (flat rated to 30 deg C) |
| GENx-1B76/P2 applicable to Bill of Material GENx-1B76/P2G01 or GENx-1B76/P2G02 | 349.2 kN (78,500 lbf) | Takeoff (5 min)* (flat rated to 30 deg C) |
| GENx-1B76A/P2 applicable to Bill of Material GENx-1B76A/P2G01 or GENx-1B76A/P2G02 | 349.2 kN (78,500 lbf) | Takeoff (5 min)* |

* 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 3 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 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 3 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 3 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 3 Paragraph IV Sub-paragraph 1)

11. Flight Envelope

Maximum Operating Altitude: 41,100 feet

See the appropriate EASA approved Airplane Flight Manual (See SECTION 3 Paragraph IV Sub-paragraph 1)

12. Operating Limitations

See the appropriate EASA approved Airplane Flight Manual (See SECTION 3 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 – 41,100 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> | 445,000 LB | 425,000 LB | 244,000 LB |

| | | | | |
|-------------------|-------------------|------------|------------|------------|
| <u>254,692 KG</u> | <u>254,011 KG</u> | 201,848 KG | 192,777 KG | 110,677 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 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 3 Paragraph IV Sub-paragraph 1)

14. Centre of Gravity Range

See the appropriate EASA approved Airplane Flight Manual
(See SECTION 3 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 |
|--|------------|
| 440 passengers: (A, A, A, A) exit arrangement | 9 |
| 355 passengers: (C, A, A, A) exit arrangement | 8 |
| 355 passengers: (A, A, C, A) exit arrangement | 8 |
| 300 passengers: (C, A, C, A) exit arrangement | 6 |

Note : At time of amended TC 787-10, the Maximum seat capacity is zero. The first of model 787-10 will be approved in a later stage.

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 is:

- 440 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)

Note : At time of amended TC 787-10, the Maximum seat capacity is zero. The first of model 787-10 will be approved in a later stage.

21. Baggage/ Cargo Compartment

| Cargo Compartment | Maximum Load | |
|-------------------|--------------|-----------|
| | Pounds | Kilograms |
| Forward | 81,500 | 36,967 |
| Aft | 67,500 | 30,617 |
| Bulk | 6,030 | 2,735 |

See appropriate Weight and Balance Manual, Boeing Document D043Z510-aaaa (where aaaa is the owner identifier).

(See SECTION 3 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 787-10 has been evaluated in accordance with the type design requirements of CS 25.1535 and found suitable for 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 D043Z510-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 Union 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

- Master Minimum Equipment List (MMEL reference D630Z004-02) approved at revision 11, dated on 09 March 2018 (or later approved revisions) as per the defined Operational Suitability Data Certification Basis : JAR-MMEL / MEL, section 1 Subpart A & B
- Required for entry into service by EU operator.

2. Flight Crew Data

- The Flight Crew data (FCD reference D015Z033-01) approved at Revision A, dated on 08 December 2017 (or later approved revisions) as per the defined Operational Suitability Data Certification Basis : CS-FCD, initial Issue.
- Required for entry into service by EU operator.
- Pilot Type Rating: "B777/787".
Note: These data cover the models B787-8, -9, -10 and B777-200, -300 and -777F series aircraft. Differences are addressed in D015Z033-01.

3. Cabin Crew Data

- The Cabin Crew data (CCD reference D6-85797, Operational Suitability Data-Cabin Crew Data - Boeing 777/787) approved at revision B, dated on 15th December 2017 (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 and B787-10 models are determined to be the same aircraft type for Cabin Crew. The B787-8/-9/-10 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 Union 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 | |
| Issue 20 | 28 Feb.18 | SECTION 3: 787-10 added | Issue 3, 28 Feb. 2018 |
| Issue 21 | 09 May. 18 | CRI F-GEN-11 is added in the 787-8 & 787-9 Sections (SECTION 1 & 2, II Certification, 5 Special Condition). Updates for MMEL 787-10 (Section 3, V Operational Suitability Data (OSD), 1 Master Minimum Equipment List). | Issue 3, 28 Feb. 2018 |
| Issue 22 | 18 March 19 | Generic wording for ETOPS (in accordance to Boeing CMP document), EASA name : European Union Aviation Safety Agency. | Issue 3, 28 Feb. 2018 |
| Issue 23 | 19 June 19 | New FAA address For 787-8, 787-9 and 787-10: added SC CRI D-GEN9 (Sections 1 & 2 & 3, II, 5) For 787-10: Introduction of GENx-1B76 and GENx-1B76A (-1B76/P2, -1B76/P2G01, -1B76/P2G02, -1B76A/P2, -1B76A/P2G01, -1B76A/P2G02; Section 3, III, 5 (Engines)) | Issue 3, 28 Feb. 2018 |
| Issue 24 | 28 Oct 19 | Integration in the 787 TCDS for all models : ESF B-13 (Post TC) | Issue 3, 28 Feb. 2018 |
| Issue 25 | 20 April 20 | For 787-8, 787-9, and 787-10: added SC CRI D-GEN10 | Issue 3, 28 Feb. 2018 |
| | | | |

-END-