



# ***European Aviation Safety Agency***

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**EASA**

**TYPE-CERTIFICATE  
DATA SHEET**

No. EASA.IM.A.115

**for  
BOEING 787**

**Type Certificate Holder:  
The Boeing Company**

1301 Second Avenue  
Seattle, WA 98101  
USA

**Airworthiness Category: Large Aeroplanes**

For Model: 787-8

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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  
1301 Second Avenue  
Seattle, WA 98101  
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-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-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 June 30, 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 June 30, 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 June 30, 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 June 30, 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

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>
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)

## **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 6, 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:

Models: Trent 1000-A, Trent 1000-C, Trent 1000-E, or Trent 1000-G (EASA Engine Type Certificate No. E.036)

Two (2) General Electric Engines:

Models: GEnx-1B64 , GEnx-1B64/P1, GEnx-1B67, GEnx-1B67/P1, GEnx-1B70, GEnx-1B70 /P1, or GEnx-1B70/75/P1 (EASA Engine Type Certificate No. E.102)

Engine Limits:

Engine Limits Data Sheet EASA E.036	787-8 RB211 Trent 1000-A (see Note 2)
Static thrust at sea level: -Takeoff (5 min)* (flat rated to 30 deg C)	307.8 kN (69,194 lbf)

Engine Limits Data Sheet EASA E.036	787-8 RB211 Trent 1000-C (see Note 3)
Static thrust at sea level: -Takeoff (5 min)* (flat rated to 30 deg C)	331.4 kN (74,511 lbf)

Engine Limits Data Sheet EASA E.036	787-8 RB211 Trent 1000-E (see Note 3)
Static thrust at sea level: -Takeoff (5 min)* (flat rated to 30 deg C)	265.3 kN (59,631 lbf)

Engine Limits Data Sheet EASA E.036	787-8 RB211 Trent 1000-G (see Note 3)
Static thrust at sea level: -Takeoff (5 min)* (flat rated to 30 deg C)	320.6 kN (72,066 lbf)
Engine Limits Data Sheet EASA E.102	787-8 GEnx-1B64 (see Note 4)
Static thrust at sea level: -Takeoff (5 min)* (flat rated to 30 deg C)	298.0 kN (67,000 lbf)
Engine Limits Data Sheet EASA E.102	787-8 GEnx-1B64/P1 (See Note 5)
Static thrust at sea level: -Takeoff (5 min)* (flat rated to 30 deg C)	298.0 kN (67,000 lbf)
Engine Limits Data Sheet EASA E.102	787-8 GEnx-1B67 (See Note 6)
Static thrust at sea level: -Takeoff (5 min)* (flat rated to 30 deg C)	308.7 kN (69,400 lbf)
Engine Limits Data Sheet EASA E.102	787-8 GEnx-1B67/P1 (See Note 7)
Static thrust at sea level: -Takeoff (5 min)* (flat rated to 30 deg C)	308.7 kN (69,400 lbf)
Engine Limits Data Sheet EASA E.102	787-8 GEnx-1B70 (See Note 8)
Static thrust at sea level: -Takeoff (5 min)* (flat rated to 30 deg C)	321.6 kN (72,300 lbf)
Engine Limits Data Sheet EASA E.102	787-8 GEnx-1B70/P1 (See Note 9)
Static thrust at sea level: -Takeoff (5 min)* (flat rated to 30 deg C)	321.6 kN (72,300 lbf)
Engine Limits Data Sheet EASA E.102	787-8 GEnx-1B70/75/P1 (See Note 10)
Static thrust at sea level: -Takeoff (5 min)* (flat rated to 30 deg C)	321.6 kN (72,300 lbf)

\* 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 IV Note 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 IV Note 1)

Oils

Oils: Refer to applicable approved Manuals.

Hydraulics

Hydraulic Fluids: Refer to the applicable approved 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 IV Note 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 IV Note 1)

## 11. Flight Envelope

Maximum Operating Altitude: 43,100 feet

See the appropriate EASA approved Airplane Flight Manual  
(See Section IV Note 1)

## 12. Operating Limitations

See the appropriate EASA approved Airplane Flight Manual  
(See Section IV Note 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 IV Note 1). Refer to the Weight and Balance Manual (See Section IV Note 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 IV Note 1)

### 14. Centre of Gravity Range

See the appropriate EASA approved Airplane Flight Manual  
(See Section IV Note 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. Maximum Seating Capacity

The maximum number of passengers approved for emergency evacuation taking into account the introduction of Type C emergency exist 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.

## 20. 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 Note 3)

## 21. 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

## 22. ETOPS

The 787-8 has been evaluated in accordance with CS 25.1535 and found suitable for 180-minute Extended Range Operations with Two-Engine Airplanes (ETOPS).

## **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, Boeing Document D043Z580-aaaa-xxxxx (where aaaa is the owner identifier and xxxxx is the aircraft serial number) must be in each aircraft at the time of original airworthiness certification.

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. 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.
2. Applicable only to Trent 1000-A Engines with or without M/SB 72-G319 incorporated.
3. Applicable only to Trent 1000-C, Trent 1000-E and Trent 1000-G Engines with M/SB 72-G319 incorporated.
4. Applicable to Bill of Materials for GENx-1B64G03 and GENx-1B64G04



5. Applicable to Bill of Material GENx-1B64/P1G01.
6. Applicable to Bill of Materials for GENx-1B67G03 and GENx-1B67G04.
7. Applicable to Bill of Material GENx-1B67/P1G01.
8. Applicable to Bill of Materials for GENx-1B70G03 and GENx-1B70G04.
9. Applicable to Bill of Material GENx-1B70/P1G01.
10. Applicable to Bill of Material GENx-1B70/75/P1G01.

## **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  
1301 Second Avenue  
Seattle, WA 98101  
United States of America

### III. Change Record

<b>Issue</b>	<b>Date</b>	<b>Changes</b>	<b>TC issue</b>
Issue 01	26 August 2011	Initial Issue for Model 787-8	Initial Issue, 26 August 2011
Issue 02	30 March 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 November 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 June 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 November 2013	CRI E-23 removed based upon acceptable compliance finding to CRI E-14	26 August 2011

-END-