Civil Aviation Administration of China (CAAC)

Aircraft Evaluation Group (AEG)

Aircraft Evaluation Report

For

787-8, 787-9

Revision 2 **Date: 08/December/2015**

Manufacturer: The Boeing Company

Revision Record & Approval

Revision No.	Section	Highlight	Date
Revision 0	All	All	December 19, 2011
Revision 1	Foreword	Include 787-8 with GEnx	July 20, 2012
	4.2	Include 787-8 with GEnx	
	5.3	Include 787-8 with GEnx	
	Appendix	Include 787-8 with GEnx	
Revision 2	All	Include evaluation of model 787-9 airplanes, add Maintenance License & Training Specification section, remove the Head-up Display/Enhanced Flight Vision System section, made minor editorial changes, and renumber sections.	December 8, 2015

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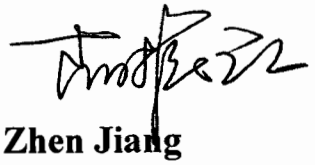

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Foreword

The FAA granted type certificate to model 787-8 airplane with Rolls-Royce Trent 1000 engines installation in August 2011.

The initial CAAC AEG evaluation of the 787-8 was in November 2011. When revision 0 of this report was being finalized, the CAAC type certification validation was in progress by CAAC Aircraft Airworthiness Department.

The FAA approved the 787-8 airplane with GEnx engines installation in March 2012. The CAAC AEG evaluation of the 787-8 with GEnx engines was conducted based on the differences statements and analysis between Rolls-Royce Trent 1000 engines configuration and GEnx engines configuration. Since the GEnx engine configuration was considered during most of the initial AEG evaluation of the 787, there was no major change in the conclusion of the AEG evaluation. Revision 1 of this report was issued to include 787-8 airplanes with GEnx engines.

The FAA issued amended type certificate to the model 787-9 airplane in June 2014. The 787-9 is a variant of the 787-8 airplane with increased dimensions and passenger capacity. The CAAC AEG evaluated the model 787-9 airplane in September 2015. Revision 2 of this report is issued to include the evaluation of the model 787-9 airplanes.

Section 1: Pilot Type Rating and Qualification Specification

1.1 Statement and Explanation

This section is the formal notification that the CAAC AEG has conducted Flight Standardization Board (FSB) evaluation of model 787-8 and 787-9 airplanes based on the Flight Standardization Board Report (FSBR) published by Federal Aviation Administration (FAA), which specifies the pilot type rating, training, checking, and currency specifications for flight crews.

Hereby, the provisions in this section can be used as the basis for Chinese operators to develop their pilot qualification and training program for model 787-8 and 787-9 airplanes.

Alternate means of compliance to the requirements of CCAR 61, 91, 121, other than specified in the provisions of this section, must be approved by Flight Standards Department of the CAAC. If an alternate means of compliance is sought, operators will be required to show the CAAC that the proposed alternate means of compliance will provide an equivalent level of safety to the provisions of this section. This may be accomplished by submitting analysis, demonstrations, proof of concept testing, differences in documentation, and other supporting evidences to the CAAC.

Find FAA FSBR here:

The FAA FSBR is available on the FAA website at the following address: http://fsims.faa.gov/PICResults.aspx?mode=Publication&doctype=FSB%20Reports

1.2 Pilot Type Rating and Licence Endorsement

The Pilot Type Rating for model 787-8 and 787-9 airplanes is listed as follows:

Manufacturer	Aircraft Type	Pilot Type Rating
The Boeing Company	777-200	B777
	777F (777-200F)	
	777-300ER	
	787-8	B787
	787-9	

Note: *Since 777 and 787 are identified as "related aircraft" in pilot type rating (common type), the MDR and ODR Tables are developed to support differences training between 787 and 777.*

License endorsement:

"B777" is the type rating designation for getting a type rating from 777-200, 777F or 777-300ER. "B787" is the designation for getting a type rating from 787-8 or 787-9. Checking records should also be shown for the specific airplane type.

1.3 ODR and MDR

Sample Operator Differences Requirements (ODR) and Master Differences Requirements (MDR) tables for 777-300ER, 787-8, 787-9 have been given as follows:

- B777-300ER to B787-8, 787-9
- B787-8, 787-9 to B777-300ER
- B787-8 to B787-9
- B787-9 to B787-8

Note 1: *The ODR Tables are available in the FAA FSB Report for 787-8, -9.*

Note 2: *The provisions between the B777 variants are described in the FSB Report for B777-200/-200ER/-200LR/-200F and B777-300/-300ER.*

MDR Table

		FROM AIRPLANE		
		777-300ER	787-8	787-9
TO AIRPLANE	777-300ER	---	D/D/C (*1**)	D/D/C (*1**)
	787-8	D/D/C	---	A/A/A
	787-9	D/D/C	A/A/A	---

Note: *1*:"Thrust Asymmetry Compensation (TAC) off" training requires "D" level training and checking.*

1.4 Specification for Training

The Type Rating Training courses proposed by Boeing for model 787-8 and 787-9 airplanes are as follows and they have to be considered as the basis for Chinese operators when developing pilot training program.

- Initial pilot type rating training course (Transition Course): (Training Manual 787-T1);
- Reduced pilot type rating training course (Shortened Transition Course): (Training Manual 787-T2);
- 777 to 787-8 differences training course (Training Manual 787-D1);
- 787-8 to 777-300ER differences training course (Training Manual 777-D2)
- 787-777 Mixed fleet flying recurrent training course: (Training Manual 787-R5);
- 787-8 to 787-9 differences hand-out (787-D9-HO).

Note 1: *The 787 Reduced Type Rating Course for initial pilot type rating is based on commonalities with the following combinations:*

- *737 300-900 with EFIS/PFD-ND and FMS to 787-8; and*
- *757/767 to 787-8.*

Note 2: *The Differences Training Course from 777 to 787-8 requires the pilot to be type rated in the B-777, with a current proficiency check, and proficient in Boeing Block Point 4 EFB.*

Note 3: *The above training courses are available by request to Boeing.*

Specifications for particular emphasis elements during training are as follows:

a) Aircraft systems, including:
   - Electrical system (e.g., pressurization);
   - EICAS engine display formats (e.g., for operation with different engine types).

b) Flight Management System (FMS), including:
   - FMS commanded speed bug during VNAV speed management according to flap configuration (next VFE speed);
   - Approach/VNAV/LNAV functions, IAN and GNSS/GLS procedures, etc.;
   - HUD TO/GA Mode Reset (use of Flight Director switches for HUD TO/GA setup);
   - Approach Procedures (e.g., potential bypass of the holding and inversion during some types of “racetrack” procedures);
   - Proper visual outside scan during prolonged FMS management;
   - Proper selection and use of FMS modes and displays, look-ahead EGPWS, Predictive Windshear System.

c) FMS-EFB data transfer and performance calculations (e.g., aircraft mass entries in EFB and FMS)

d) HUD use and symbology, including:
   - The symbology for unusual attitude indications;
   - Pilot eye reference position;

- HUD use by pilot flying (PF) and pilot monitoring(PM); visual outside scan, CRM concept;
- PFD and HUD correlation.

e) Navigation Display (ND) (e.g., clock function, airport moving map and vertical situation display, ANP/RNP symbology, etc.)

f) Electronic Checklist (ECL), including:
- Normal, supplementary normal and non-normal functions, proper use of ECL notes;
- Use of paper back-up;
- Crew coordination.

g) Flight control system, including:
- Modes of operation;
- Fly-by-wire characteristics;
- Bank angle indications and protection;
- Stall and overspeed protection;
- Auto-throttle “wake up” function;
- Emergency equipment and flight crew procedures, including location, type/function and operation of emergency equipment.

The following special events trainings are not considered as required additional trainings; but, they improve basic crew understanding and confidence regarding aircraft handling qualities, options and procedures as these relate to design characteristics and limitations.

- Recovery from unusual attitudes;
- Manual flight with minimum use of automation, including flight under degraded automation;
- Handling qualities and procedures during recovery from an upset condition (e.g., vortex encounter, loss of control incident);
- High altitude high and low speed buffet margins and flight characteristics;
- Controlled Flight Into Terrain (CFIT), TCAS, EGPWS (emphasis on avoidance and escape maneuvers, altitude awareness, TCAS / EGPWS warnings, situational awareness and crew co-ordination, as appropriate).

1.5 Specification for Checking

As required by CCAR Part 61 and 121, the initial 787 type rating check or practical test must be conducted on 787-8 or 787-9, even following 777 to 787 differences training.

For mixed fleet flying, a proficiency check that is conducted on 777 or 787 will be valid for the other aircraft provided that the differences have been covered during the recurrent training per the approved ODR tables.

Note 1: *When operating more than one type of 777 variant and 787 variant, recurrent checks should be alternated between the variants flown to the extent possible.*

Note 2: *If mixed fleet flying of HUD and non-HUD equipped aircraft, the operator should have approved ODR tables reflecting the HUD installation.*

1.6 Specification for Currency

As required by CCAR Part 61 and 121, except for mixed fleet flying, takeoffs and landings performed on either 777 or 787 will be valid for the other aircraft.

1.7 Specification for Flight Simulation Training Devices

The Flight Simulation Training Devices qualified in accordance with CCAR Part 60 are available for Boeing 787.

There is only 787-8 Simulator for 787 series airplanes. The 787-9 flight training can be conducted with a 787-8 Simulator and “A” level differences handout.

Section 2: Maintenance License and Training Specification

2.1 Statement and Explanation

This section is the formal notification that the CAAC AEG has conducted Maintenance Training Evaluation (MTE) for model 787-8 and 787-9 airplanes based on the documentation provided by Boeing.

Thus, the provisions in this section can be used as the basis for Chinese operators to develop their maintenance personnel qualification and training program for model 787-8 and 787-9 airplanes.

Alternate means of compliance other than specified in the provisions of this section must be approved by Flight Standards Department of the CAAC.

2.2 Maintenance License Endorsement

The maintenance license endorsement for model 787-8 and 787-9 airplanes is listed as follows:

Manufacturer	Aircraft Type/Model	License Endorsement
The Boeing Company	787-8	787 (GE) 787 (RR)
	787-9	

2.3 Specification for Training

The maintenance training standard course curriculum proposed by Boeing for 787 airplanes is as follows. Operators and maintenance training providers should consider these courses as a baseline when developing maintenance training program.

- Master Minimum Maintenance Type Training Syllabus 787-8/9

Note 1: *The above training syllabus includes both theoretical and practical training for the following categories:*
- *Mechanical (ME) Category II*
- *Avionics (AV) Category II*
- *Mechanical / Avionics Combined (ME/AV) Category II*

Note 2: *The syllabus includes relevant information for both GE and RR engines.*

Note 3: *For Airplane options, it is the operator's responsibility to compare the detail differences based on their actual configurations; and, the differences training may be conducted by the operator or its contracted maintenance organization.*

Note 4: *The above training courses are available by request to Boeing.*

Section 3: Master Minimum Equipment List

3.1 Statement and Explanation

This section is the formal notification that CAAC AEG has conducted Flight Operation Evaluation Board (FOEB) evaluation for model 787-8 and 787-9 airplanes based on the 787 Master Minimum Equipment List (MMEL) published by the Federal Aviation Administration (FAA) which outlines instruments and equipment that may be inoperative for flight, and yet maintain an acceptable level of safety by appropriate conditions and limitations.

Hereby, the MMEL and its future revisions published by FAA can be used as the basis for Chinese operators to develop their Minimum Equipment List (MEL) for the above stated model 787 airplanes.

Find FAA MMEL here:
The 787 MMEL is available on the following FAA website and also on MyBoeingFleet:
http://fsims.faa.gov/PICResults.aspx?mode=Publication&doctype=MMEL

3.2 CAAC Supplemental

Not applicable.

Section 4: Maintenance Review Board Report

4.1 Statement and Explanation

This section is the formal notification that CAAC AEG has conducted Maintenance Review Board (MRB) evaluation for model 787-8 and 787-9 airplanes based on the 787 Maintenance Review Board Report (MRBR) Document approved by Federal Aviation Administration (FAA), which outlines the initial minimum maintenance requirements to be used in the development of an approved operator's maintenance program for the airframe, engines, systems and components.

Hereby, the MRBR and its future revisions approved by FAA can be used as the basis for Chinese operators to develop their maintenance program for the above stated model 787 airplanes.

MRBR distribution:
The 787 MRBR is available on MyBoeingFleet and Maintenance Performance Toolbox.

4.2 CAAC Supplemental

Not applicable.

Section 5: Operational and Continued Airworthiness Instructions

5.1 Statement and Explanation:

This section is the formal notification that CAAC AEG has conducted evaluation of the operational and continued airworthiness instructions for model 787-8 and 787-9 airplanes and the related Boeing policies and procedures.

Hereby, the Operational and Continued Airworthiness Instructions documents listed below were found acceptable by the CAAC AEG that these documents give the necessary guidance for operating and maintaining the model 787-8 and 787-9 airplanes within the approved operating conditions and limitations.

This acceptance does not assure the accuracy and applicability of the content in each document. It is the responsibility of the owner or the operator to report any defect or discrepancy in these documents to the aircraft manufacturer or the CAAC AEG by mail box: aeg@caac.gov.cn.

Operational & Continued Airworthiness Instructions distribution:

The operational and continued airworthiness documents are available on MyBoeingFleet and Maintenance Performance Toolbox; the engine manuals are directly distributed to operators by the engine manufacturer.

5.2 List of Operational and Continued Airworthiness Instructions (787-8/-9)

Manual	Reference No.	Description	Revision/Date
MPD	D011Z009-03	Maintenance Planning Data	As revised
AMM	B787-81205-A0801-00	Aircraft Maintenance Manual	As revised
FIM	B787-81205-A0806-00	Fault Isolation Manual	As revised
NDT	D634Z301	Non Destructive Testing Manual	As revised
SRM	B787-81205-Z0210-00	Structure Repair Manual	As revised
Task Card	D633Z109	Task Cards	As revised
IPD	B787-81205-A0807-00	Illustrated Parts Data	As revised
WDM	B787-81025-ZFF12-00	Wiring Diagram Manual	As revised
ITEM	D013Z003-01	Illustrated Tool & Equipment Manual	As revised
FCOM	D615Z003	Flight Crew Operations Manual	As revised
QRH	D615Z003	Quick Reference Handbook	As revised
FCTM	FCT 787 (TM)	Flight Crew Training Manual	As revised
FAM	D900Z022	Flight Attendant Manual	As revised
W&B	D043Z580	Weight & Balance Manual (Airplane Weighing Procedures)	As revised
DDG	D630Z004-01	Dispatch Deviations Guide	As revised
CMP	D021Z002-01	Configuration, Maintenance, and Procedures	As revised
EISD	D011Z009-10	Electrical Wiring Interconnection Systems (EWIS) Source Document	As revised

Note 1: *The acceptance of the above manuals is not affected by change in document reference numbers due to customization.*

Note 2: *The 787 Continued Airworthiness Instructions documents are stored in Maintenance Performance Toolbox and training would be necessary for increased efficiency and effectiveness in locating and accessing relevant maintenance information.*

Note 3: *The following documents were approved during the type certification process for model 787 series airplanes, and must be followed by Chinese operators for operation and maintenance within approved limitations:*

- *AFM: Airplane Flight Manual (D631Z003)*
- *AFM Appendixes:*
  - *Configuration Deviation List (D631Z003-CDL)*
  - *Landing Gear Extended (D631Z003-1)*
- *Airworthiness Limitations (D011Z009-03-01)*
- *Airworthiness Limitations - Line No. Specific (D011Z009-03-02)*
- *Certification Maintenance Requirements (D011Z009-03-03)*
- *Special Compliance Items (D011Z009-03-04)*
- *Structural Repair Manual (B787-81205-Z0210-00)*

- *ETOPS Configuration, Maintenance, and Procedures (CMP) (D021Z002-01)*

Note 4: *Some non-type-specific airplane manuals (e.g., Standard Wiring Practices Manual) may also need to be referenced by the operator. Please check MyBoeingFleet website for more information.*

Note 5: *Boeing issues Operations Manual Bulletins as the need arises to quickly transmit technical and operational information. It is distributed by Bulletin Addendum (BA) to operators who need early notification of this information.*

Note 6: *Trent 1000 and GEnx Engine manuals including Operating Instruction, Maintenance Manual, Installation Manual, Engine Manual and Time Limited Dispatch Summary Document, are developed and distributed by the engine manufacturer; please refer to the Engine TCDS for more information.*

Note 7: *Component maintenance procedures may reference to Boeing OHM/CMM Publication Index (Doc. No. D6-47081) and can be found on the MyBoeingFleet website.*

Section 6: CCARs Compliance Checklist

6.1 Statement and Explanation:

This section is the formal notification that CAAC AEG has developed the compliance checklist for model 787-8 and 787-9 airplanes based on the following aircraft configuration documents:

- FAA Type Certificate Data Sheet (TCDS) No. T00021SE, Revision 19
- 787 Airplane Flight Manual (AFM), D631Z003

The checklist is provided as an aid to identify those specific operational requirements for which compliance has already been demonstrated by the type design. The checklist also identifies requirements that are operational in nature which require operator action or demonstration for compliance.

When the aircraft configuration differs from the above stated aircraft configuration, it is the responsibility of the operator and its CAAC Principal Inspector (PI) to evaluate those differences and develop compliance with the relevant requirements.

It also remains the responsibility of the operator and their PI to evaluate the corrective actions for those items not in compliance in the checklist prior to approval of the appropriate operation.

6.2 CCAR-91R2 and CCAR-121R4 Compliance Checklist for 787-8/-9 airplanes

(1) Basic Requirements

Item	CCAR Ref.	Compliance Status	Explanation/*Limitation*
1.1 Aircraft Category	--	--	Type certified as transport category airplane
	§121.153	In Compliance	Type certified as transport category airplane
1.2 Minimum Flight Crew	--	--	Required flight crew: Two Pilots
1.3 Noise limitation	§91.401	In Compliance	Compliance was demonstrated for FAR 36. For more information, refer to TCDS of CAAC VTC
1.4 Fuel Venting and Exhaust Emissions	§91.401	In Compliance	Compliance was demonstrated for FAR 34. For more information, refer to TCDS of CAAC VTC
1.5 Ditching	§121.157	In Compliance	Compliance with the ditching requirements of 25.801 has been established.
1.6 Full scale Emergency Evacuation Demonstration	§121.161	In Compliance	Compliance demonstrated by analysis during type certification. (Refer to Section 7.4 for more information).
1.7 Extended range operation with two engine airplanes (ETOPS)	§121 App H	Optional Compliance	The type design reliability and performance of airplane/engine combination has been evaluated and found suitable for greater than 180 minutes extended range operations when configured in accordance with FAA approved Boeing document, D021Z002-01, "Model 787 ETOPS Configuration, Maintenance, and Procedures."

(2) Basic Flight Operation

Item	CCAR Ref.	Compliance Status	Explanation/*Limitation*
2.1 Visual Flight Rules (VFR) operation	§91.403 §121.305	In Compliance	VFR operation approved by type certification.

Item	CCAR Ref.	Compliance Status	Explanation/*Limitation*
2.2 Instrument Flight Rules (IFR) operation	§91.405 §91.409 §121.305 §121.325	In Compliance	IFR operation approved by type certification.
2.3 Night and over-the-top operation	§91.407 §121.323	In Compliance	Both day and night operation approved by type certification.
2.4 Operation in icing conditions	§91.425 §121.341	In Compliance	Operation in icing conditions approved by type certification.

(3) Emergency and life-saving equipment

Item	CCAR Ref.	Compliant Status	Explanation/*Limitation*
3.1 Hand fire extinguishers	§91.415 §121.309	Optional Compliance	The flight compartment includes a halon fire extinguisher. Passenger/galley fire extinguishers are available by customer selection.
3.2 Seat and Safety belt	§91.415 §121.311	Optional Compliance	The pilot and observer seats have crotch straps, lap belts and inertial-reel shoulder harnesses with manual locks. Passenger and cabin crew seats will be installed in accordance with the buyer`s interior arrangement. The attendant seats have an adjustable shoulder harness with a single-point release from a single buckle.

Item	CCAR Ref.	Compliant Status	Explanation/*Limitation*
3.3 Sign or Instruction	§91.415 §121.309 §121.317 §121.361	Optional Compliance	Placards and markings supply information on operating instructions, installation instructions, servicing instructions, position identification, rescue and escape instructions and safety precautions. Compartments and containers are marked as to identify contents. Lighted passenger information signs have an ON-AUTO-OFF control in the aft electronics panel. A passenger service unit (PSU) is within reach for each passenger. The PSUs include fasten seat belt and no smoking signs. An English placard is installed that reads "Federal Law Provides for a penalty of up to $3,200 for Tampering with the Smoke Detector Installed in this Lavatory." Bilingual placards and markings are available by customer selection.
3.4 Spare electrical fuses or Protective fuses	§91.415 §121.313	Not Applicable	Electrical fuses are not used on this airplane. Electrical circuit breakers are installed instead.
3.5 Marking of break-in points	§91.415	Option Compliance	The customer can select emergency exterior chop-in (or break-in) markings. These will be shown on the customer's decorative drawing.
3.6 Crash axe	§91.415 §121.309	In Compliance	The flight compartment contains one crash axe.
3.7 Portable megaphone	§91.415 §121.309	Option Compliance	Megaphones are available by customer selection.
3.8 Public address systems	§121.318	In Compliance	A passenger address system is installed.
3.9 Crewmember interphone system	§121.319	In Compliance	The cabin interphone system is integrated into the service interphone system. The service interphone system enables communication between the flight compartment and the passenger compartment, and the flight compartment and the service connections.

Item	CCAR Ref.	Compliant Status	Explanation/*Limitation*
3.10 Life jacket or equivalent flotation device	§91.417 §91.419 §121.339	Optional Compliance for over water Operation	Life vests, that include a survivor locator light, are installed in the flight deck for use by pilots and observers, each flight attendant seat and every passenger seat location. A customer selection is required for life vests in the flight compartment. Life vests for passengers, attendants and/or supernumeraries are available by customer selection.
3.11 Equipment for making the sound signals	§91.417	Not applicable	
3.12 Anchor	§91.417	Not applicable	
3.13 Life raft	§91.417 §91.419 §121.339	Optional Compliance	The airplane is equipped with escape slide/rafts at all passenger and service doors. Customers must make a selection for life rafts.
3.14 Pyrotechnic signaling device	§91.417 §91.421 §121.339 §121.353	In Compliance	A separate pouch attached to each slide-raft contains one day-night signal flares.
3.15 Flotation equipment	§91.419	Not applicable	
3.16 Life-saving equipment (including means of sustaining life)	§91.419 §91.421 §121.339 §121.353	Optional Compliance	Life-saving equipment is available by customer selection.

Item	CCAR Ref.	Compliant Status	Explanation/*Limitation*
3.17 Oxygen equipment	§91.423 §121.327 §121.329 §121.331 §121.333	Compliance for flight compartment oxygen requirements; Optional compliance for passenger oxygen requirements	An oxygen system is provided for: - Two hours' worth of oxygen for Flight Crew oxygen masks - Portable oxygen equipment is installed for each attendant - Twelve minutes of passenger oxygen is available as basic equipment - Optional extended-duration chemical oxygen generators in the overhead passenger, attendant, and lavatory service units provide 22-minute supplemental oxygen. Longer durations require a gaseous oxygen system. - An EROS full face mask with removable built-in goggles is provided for each flight deck occupant. This is a quick-donning diluter-demand mask.
3.18 Emergency locator transmitter (ELT)	§91.435 §121.339 §121.353	Optional Compliance	Customers can select installation of an automatic emergency locator transmitter (ELT) that is fixed to the airplane and is automatically activated by an acceleration sensor (a function of a g-force and time). Survival (portable) ELTs are available by customer selection. When activated, the ELT transmits on three frequencies: 243 MHz, 121.5 MHz, and 406 MHz.
3.19 Flashlight	§121.310	Optional Compliance	Flashlights are available by customer selection.
3.20 Lavatory fire protection	§121.308	In Compliance	A smoke detector is installed in each lavatory. The detector provides an aural warning (horn) and an EICAS message is sent to the flight deck in the event smoke is detected. A non-halon fire extinguisher is installed in the lavatory waste compartment. The fire extinguisher operates automatically to extinguish a fire in the waste Compartment.
3.21 Protective breathing equipment	§121.337	Optional Compliance	One Protective breathing equipment (PBE) is installed in the flight deck. A customer selection is required to install additional protective breathing equipment in the flight compartment, supernumerary compartment and passenger compartment.

(4) Communication, Navigation and Surveillance Equipment

Item	CCAR Ref.	Compliant Status	Explanation/*Limitation*
4.1 Basic radio communication and navigation equipment	§91.411 §91.413	In Compliance	The airplane has a speech communication system that includes: • Dual high frequency (HF) system • Triple very high frequency (VHF) system • Single SATCOM system The VHF radios are designed for 8.33-kHz channel spacing and can be tuned to 121.5 MHz. Dual integrated navigation radio (INR) systems are installed. The INR architecture consolidates the GPS, GLS, ILS, and VOR/MB functions into a single integrated navigation radio processing unit.
4.2 Radio communication and navigation equipment for CCAR-135 operation	§135.169	--	--
	§135.173	--	--
4.3 Radio communication and navigation equipment for CCAR-121 operation	§121.345 §121.347 §121.349 §121.351	In Compliance	The airplane has a speech communication system that includes: • Dual high frequency (HF) system • Triple very high frequency (VHF) system • Single SATCOM system The VHF radios are designed for 8.33-kHz channel spacing and can be tuned to 121.5 MHz. Dual integrated navigation radio (INR) systems are installed. The INR architecture consolidates the GPS, GLS, ILS, and VOR/MB functions into a single integrated navigation radio processing unit. ADF, VOR, and DME are installed to receive navigational signals (all navigation systems are dual redundant).

Item	CCAR Ref.	Compliant Status	Explanation/*Limitation*
4.4 ATC transponder	§91.427 §121.345	In Compliance	An ATC/Mode S transponder system is incorporated into each ARINC 768 Integrated Surveillance System (ISS).
4.5 Air ground two way data link communication system	§121.346	Optional Compliance	The Data Communication Management System (DCMS) is an integrated system that provides data link message exchanges with the ground ACARS station, using VHF (including VDL Mode 2 when suitable ground stations are available), HF data link and SATCOM media.
4.6 Equipment for operations use specialized means of navigation	§121.355 §121 App. I	In Compliance	The following navigation systems are installed: • Air Data Reference Function (in-flight control electronics) • Pitot-static probes, static ports, Air Data Modules, and AOA vanes • Flight Management Function (in CCS) • Earth Reference System (ERS) • Dual Integrated Navigation Radio (INR) system • Dual Radio Altimeter system • Dual Distance Measuring Equipment (DME) system • Dual Integrated Surveillance System (ISS) Approval of other special navigation method is operator's responsibility.
4.7 Altitude holding and warning system	§91.429 §121.320	In Compliance	Altitude is indicated on the PFD, HUD and the standby ISFD. The Autoflight Mode Control Panel (MCP) provides altitude hold. Aural and visual altitude alerting is provided when approaching or departing the altitude selected in the MCP altitude window.
4.8 Airborne thunderstorm detection equipment	§135.179	--	--
4.9 Weather radar	§91.431 §121.357	In Compliance	The airplane is equipped with a dual Predictive Windshear System (PWS)/Weather Radar System (WXR). The PWS/WXR is part of the ARINC 768 Integrated Surveillance System (ISS).

Item	CCAR Ref.	Compliant Status	Explanation/*Limitation*
4.10 Terrain awareness and warning system (TAWS） Ground proximity warning / glide slope deviation alerting system	§91.437 §121.354 §121.360	In Compliance	A Terrain Awareness and Warning System (TAWS) is incorporated into each ARINC 768 Integrated Surveillance System.
4.11 Traffic Alert and Collision Avoidance equipment	§91.439 §121.356	In Compliance	A Traffic Alert and Collision Avoidance System (TCAS) is incorporated into Each ARINC 768 Integrated Surveillance System (ISS).
4.12 Low altitude windshear system equipment	§121.358	In Compliance	The airplane is equipped with a dual Predictive Windshear System (PWS)/Weather Radar System (WXR).
4.13 Radiation indicator	§91.441	Not applicable	The 787 has a maximum operating altitude of 43,100 feet.
4.14 Required navigation performance	§91.413	In Compliance	The type design is qualified for operation in RVSM airspace.
	AC-91-01R1 AC-91-5 AC-91-7 AC-91-8 AC-91-9 AC-91-12 AC-121-13	In Compliance	The 787 meets the performance and function criteria or these Required Navigation Performance (RNP) operations: Approach: RNP AR, RNP APCH, Baro-VNAV Terminal: RNAV 1, RNAV 2, RNP 1 En-route: RNAV 1, RNAV 2, RNAV 5 Oceanic and Remote Area: RNP 4
4.15 Low visibility operation	§91.413 §91 App B AC-91-18	In Compliance	The airplane and the installed weather equipment to support low-weather minima operations to Category I/II/III Approach.
	AC-91-03R1 AC-91-15 AC-91-16	In Compliance	Dual HUDs are provided as basic equipment and operational credit has been approved for usage in low visibility takeoff only.

Item	CCAR Ref.	Compliant Status	Explanation/*Limitation*
4.16 ADS-B	AC-91-14	In Compliance	The Transponders meet D0-260A standards for ADS-B transmissions of airplane position information.
4.17 SATCOM	AC-121-004R1	In Compliance	The airplane has a speech communication system that includes a SATCOM.

(5) Recording Equipment

Item	CCAR Ref.	Compliant Status	Explanation/*Limitation*
5.1 Flight recorder	§91.433 §121.343	FDR In Compliance	The airplane is equipped with a combination recording system that records flight deck voice, parametric flight data, data link messages and stores the Data in crash-protected memories. The flight data recorder has 25 hour capacity.
	§91.433 §121.343 §121.359	CVR In Compliance	A dual redundant ED-112 compliant cockpit voice recorder system is installed as part of the integrated recording system.
5.2 Quick Access Recorder or equivalent equipment	§121.344	In Compliance	The quick-access data recorder (QAR) is replaced by the real-time parameter logging function of the airplane condition monitoring function (ACMF). The ACMF can collect and record airplane data that can be used with ground analysis tools.

(6) Other Requirements

Item	CCAR Ref.	Compliant Status	Explanation/*Limitation*
6.1 Forward Observer's seat	§121.589	In Compliance	The flight deck is designed for a flight crew of two pilots, with additional seats, amenities, and equipment for First and Second observers.
6.2 Airspeed indicator	§121.301	In Compliance	Instrument data markings, nameplates, signs, instructions, flight crew operations, and flight manual data are provided with English units. Airspeed is calibrated in Knots. Alternate units may be selected through airline selectable options (ASO).

Item	CCAR Ref.	Compliant Status	Explanation/*Limitation*
6.3 Altitude indicator	§121.301	In Compliance	Altitude is displayed in feet and can be displayed in meters when the electronic flight instrument system switch is set.
6.4 Flight deck door	§121.313	In Compliance	The flight compartment door and bulkhead construction incorporate intrusion and ballistic characteristics compliant with 25.795. Keyless locking system and crew alerting through the engine indication and crew alerting system. A placard with the text 'crew only' is affixed to the door.
6.5 Space of passenger seats	§121.213	Optional Compliance	Passenger and cabin crew seats will be installed in accordance with the buyer`s interior arrangement.
6.6 Carriage of cargo in passenger compartments	§121.215	Not applicable	The 787 is not designed to carry cargo in passenger compartment.
6.7 Carriage of cargo in cargo compartments	§121.217	Not Applicable	This requirement is not applicable since the 787 cargo compartments are not designed to require the physical entry of a crewmember to extinguish a fire (an integral cargo fire protection system is installed). Each cargo hold is a class C compartment with a smoke detection and fire suppression systems.

Section 7: Other Evaluation Items

7.1 Forward Observer Seat

Based on the FAA FSB Report and the Boeing Compliance Statement for Forward Observer Seat, the CAAC AEG has concluded that the Forward Observer's Seat of the model 787-8 and 787-9 airplanes is considered to have met the requirements of AC-121-28.

Modifications to the above facilities from the original specifications will need approval by the responsible CAAC Principal Inspector (PI). This may require submittal of additional analysis, demonstrations, proof of concept testing, differences documentation, or other relevant evidences to the CAAC.

7.2 Flight Crew Sleeping Quarters

The Overhead Flight Crew Rest (OFCR) is an optional facility installed on model 787-8 and 787-9 airplanes.

Based on the FAA FSB Report and the Boeing Compliance Statements for OFCR, the CAAC AEG has concluded that the OFCR facilities installed on model 787-8 and 787-9 airplanes are considered to have met the requirements of AC-121-008 (except the noise level test has not yet been conducted). However, specific operational approval is required for an operator to use the OFCR and the following requirements should be considered during the evaluation:

Occupancy:

Only approved crewmembers, trained in OFCR evacuation procedures, may occupy the OFCR. Clear definition of "crewmembers" allowed to occupy the OFCR must be specified in the operational approval to use this facility.

Rescue and Emergency Evacuation:

Operators should have written procedures regarding rescue and evacuation pertaining to occupants of the OFCR compartment, if OFCR is used for Taxi, Takeoff or Landing (TTL). As a minimum the following is needed:

- For planned evacuations, OFCR occupants should be relocated to the main deck prior to landing if seats are available and time permits.
- If an in-flight emergency occurs where an evacuation is possible, and the situation permits, the crew must inform the appropriate Air Traffic Services Unit that there is an occupied OFCR onboard. This information should include the number of occupants and the location of the OFCR onboard.
- At least one cabin crew member is given responsibility to ensure occupants of the OFCR are evacuated if an evacuation command is given.

Training – Occupants:

As a minimum, prior to occupying the OFCR, crewmembers must be familiarized with the conditions for occupancy and the safety provisions and equipment of the OFCR facility, including the following:

- Maximum allowable occupancy for TTL and in flight
- Fire extinguishers and smoke hoods (firefighting procedures)
- Emergency oxygen (decompression procedures)
- Primary and secondary escape routes (evacuation procedures)
- Reminder that Flight Attendants will provide further direction after reviewing the outside conditions
- Communication system
- Occupant use of seat and ancillary equipment, seat belts and bunk restraints during turbulence and critical phases of flight
- Restrictions prohibiting bunk use during takeoff and landing, (as appropriate)

Procedures and Training - Flight Attendant:

OFCR familiarization must also be included in flight attendant training to include the above items and additional responsibilities for ensuring the OFCR, if occupied, are evacuated during an airplane evacuation.

Procedures must be developed and included in training for the following:

- Closing the OFCR door after takeoff, and opening the door prior to landing
- Requirement to minimize rest disruptions
- Prevention of unauthorized entry to the OFCR compartment

Modifications to the above facilities from the original specifications will need approval by the responsible Principal Inspector (PI) of CAAC. This may require submittal of additional analysis, demonstrations, proof of concept testing, differences documentation, or other relevant evidences to the CAAC.

Note: *The noise level compliance could be evaluated by POI when Boeing test results become available.*

7.3 Electronic Flight Bag

This paragraph is the formal statement that CAAC AEG has evaluated Electronic Flight Bag (EFB) Block Point 4 of model 787-8 and 787-9 airplanes based on the FAA Flight Standardization Board Report (FSBR) for Boeing Class 3 EFB - Block Point 4, and has concluded that the compliance, at the manufacturer level, of Boeing Class 3 EFB - Block Point 4 for operational use on model 787-8 and 787-9 airplanes.

Operators are required to obtain operational approval from the CAAC to use the EFB on

model 787-8 and 787-9 without paper backup.

Modifications to either the software or hardware from the original specifications will need re-approval by Flight Standards Department of CAAC. This may require submittal of additional analysis, demonstrations, proof of concept testing, differences documentation, or other evidences to the CAAC.

Note 1: *Dual Class 3 Electronic Flight Bag (EFB) Block Point 4 is the baseline configuration on model 787-8 and 787-9 airplanes.*

Note 2: *FAA FSBR gives the operational procedure, data revision process, pilot training, checking, and currency specifications for operating applicable Boeing Airplane using the EFB.*

Note 3: *Boeing CBT-based EFB Training Programme for pilot is recommended by CAAC AEG.*

Find FAA FSBR here:

The FSBR for Boeing Class 3 Electronic Flight Bag (EFB) Block Point 4 is available on the following FAA
site: http://fsims.faa.gov/PICResults.aspx?mode=Publication&doctype=FSB%20Reports

7. 4 Emergency Evacuation Demonstration

The model 787-8 and 787-9 airplanes evacuation capability compliance to FAA 25.803 was shown by a combination of test and analysis, not by actual full-scale demonstration; and, that was approved by FAA during type certification process.

Based on the determination in the FAA FSBR, the CAAC AEG considers model 787-8 and 787-9 airplanes to be in compliance with the full capacity emergency evacuation demonstration during the type certification process, and maximum numbers of passengers approved for emergency evacuation are as follows:

787-8:

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

787-9:

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

The Boeing Flight Attendant Manual (FAM) provides evacuation system component description and emergency evacuation guidelines. Boeing also offers a video titled “Flight Attendant Evacuation Techniques” that can further assist operators in developing their own emergency evacuation procedures.

Appendix: CAAC AEG Team and Point of Contact

A.1: CAAC AEG Process Participants

FSB:	
Capt. Wu Cheng Chang	Deputy Director General, Flight Standards Department (777 to 787 Difference Course)
Capt. Zhao Zhi Qiang	Shanghai Aircraft Airworthiness Certification Center (PQP Meeting)
FOEB:	
Mr. Xie Bao Liang	Deputy Director, AEG Office of Shanghai Aircraft Airworthiness Certification Center (MMEL Development Meeting)
MRB:	
Mr. Wang Jin	Deputy Director, AEG Office of Civil Aviation Safety and Technology Center (ISC/MRB Meeting)

A.2: CAAC AEG Final Evaluation Team

Mr. Xue Shi Jun	Director, Aircraft Evaluation Division, Flight Standards Department
Mr. Zhang Ling Zhi	Deputy Chief, Aircraft Evaluation Division, Flight Standards Department
Capt. Chen Li Ping	Deputy Director General, Civil Aviation Safety and Technology Center
Capt. Zhao Zhi Qiang	Shanghai Aircraft Airworthiness Certification Center

A.3: Boeing Point of Contact

Mr. Ron Lockhart	Senior Manager, Regulatory Operations Support
Mr. Jerry Bauer	Program Manager, Regulatory Operations Support
Capt. Philip Adrian	Chief Pilot, Regulatory Affairs
Ms. Diana Chiao	Account Manager/Feature Manager, Customer Engineering
Mr. Ray Tang	Boeing China Support Office

B.1: CAAC AEG Evaluation Team for 787-8 GEnx Engines

Mr. Xue Shi Jun	Director, Aircraft Evaluation Division, Flight Standards Department
Mr. Zhang Ling Zhi	Deputy Chief, Aircraft Evaluation Division, Flight Standards Department
Mr. Liu Yun Lei	Engineer, AEG Office of Civil Aviation Safety and Technology Center

B.2: Boeing Point of Contact for 787-8 GEnx Engines

Mr. Ron Lockhart	Senior Manager, Regulatory Operations Support
Mr. Jerry Bauer	Program Manager, Regulatory Operations Support

C.1: CAAC AEG Evaluation Team for 787-9

Mr. Xue Shi Jun	Director, Aircraft Evaluation Division, Flight Standards Department
Mr. Wang Jin	Director, AEG Office of Civil Aviation Safety and Technology Center

C.2: Boeing Point of Contact for 787-9

Mr. Yohannes Amare	Senior Program Manager, Aviation System Safety and Regulatory Affairs, Boeing Commercial Airplanes
Mr. Zhang Shupi	Regional Manager, Safety and Regulatory Affairs, Commercial Aviation Services, Boeing China Support Office