Civil Aviation Administration of China (CAAC)

Aircraft Evaluation Group (AEG)

Aircraft Evaluation Report

For

747-8I and 747-8F

Revision 0 **Date: 14/August/2014**

Manufacturer: The Boeing Company

Revision Record & Approval

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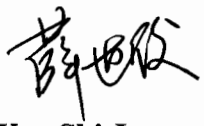

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Foreword

747 series aircraft was first type certificated by the Federal Aviation Administration (FAA) as transport airplane in December 1969, which is type designated as 747-100, and further developed variant as 747-200B, 747-200F, 747-200C, 747SR, 747SP, 747-100B, 747-300, 747-100B, 747-400, 747-400D, 747-400F,

747-8F (Freighter) is based on the model 747-400F with design changes to the empennage, fuselage, landing gear, wings, engines, fuel systems, and other aircraft systems, and type certificated by the FAA in August 2011.

747-8 (Intercontinental, here in after referred to as “747-8I”) is based on the model 747-400 with design changes to the empennage, fuselage, landing gear, wings, engines, fuel systems, and other aircraft systems, and type certificated by the FAA in December 2011.

747 series aircraft type certificate has been validated by the CAAC Aircraft Airworthiness Department since June 1991 including 747-200 and 747-400, and last validated variant is 747-400F in August 2002. The 747-8I and 747-8F type validation by the CAAC Aircraft Airworthiness Department is in progress at the time of this writing.

747 series aircraft was evaluated by the CAAC AEG in July 2013. The focus of the evaluation was on 747-8I and 747-8F since the previous variants were considered as grandfathered type for the CAAC AEG evaluation. Nevertheless, as 747-400 series involved changes to pilot qualification specifications, CAAC AEG catch-up evaluation was conducted for Flight Standardization Board (FSB) evaluation.

Further discussions after the above evaluation were completed in August 2014.

The initial version of this report was finalized based on the conclusions of the above evaluation and discussions.

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 for Boeing 747-8I and 747-8F airplane based on the Flight Standardization Board (FSB) Report published by the FAA, which specifies the pilot type rating, training, checking, and currency specifications for the flight crews.

Thus the provisions in this section can be used, as the basis, by Chinese operators to develop their pilot qualification and training program for 747-8I and 747-8F model 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 alternate compliance is sought, operators will be required to establish that proposed alternate means and provide the following to the CAAC: an equivalent level of safety to the provisions of this section, analysis, demonstrations, proof of concept testing, differences in documentation, or other supporting evidence as required.

Find FAA FSB Report here:

http://fsims.faa.gov/PICResults.aspx?mode=Publication&doctype=FSB%20Reports

1.2 Pilot Type Rating and Licence Endorsement

Upon the FSB evaluation, the Pilot Type Rating for 747-400, 747-400F, 747-8I and 747-8F is listed as follows:

Manufacturer	Aircraft Type	Pilot Type Rating
The Boeing Company	747-400	B-747-4
	747-400F	
	747-8I	
	747-8F	

Note: *As 747-400 and 747-400F share the same pilot type rating, catch-up evaluation has been conducted by the CAAC AEG, and pilot type rating and qualification specification is included in this report.*

License endorsement:

"B-747-4" is designation for getting a type rating for 747-400, 747-400F, 747-8I or 747-8F, and checking records should also be shown for the specific model/variant.

1.3 ODR and MDR

Sample Operator Difference Requirement (ODR) and Master Difference Requirement (MDR) tables for 747-400, 747-8I and 747-8F have been given as follows:

-747-400 to 747-8I Master Operator Differences Requirements Table
-747-400F to 747-8F Master Operator Differences Requirements Table
-747-8F to 747-8I Master Operator Differences Requirements Table

Note: *The **above** ODRs are available by request from Boeing.*

MDR Table

		FROM AIRPLANE			
		747-400	747-400F	747-8I	747-8F
TO AIRPLANE	747-400	--	A/A/A	TBD	TBD
	747-400F	A/A/A	--	TBD	TBD
	747-8I	C/C/B	C/C/B	--	A/A/A
	747-8F	C/C/B	C/C/B	A/A/A	--

1.4 Specification for Training

The Type Rating Training course proposed by Boeing for 747-400, 747-400F, 747-8I and 747-8F is as follows, and it has to be considered as a baseline for operators in developing their pilot training program:

- 747 Type Rating Training (Document Number: 747-T1)

Note 1: *The above training course includes both the 747-400 and 747-8 airplanes. Training events specific to the 747-400 are annotated with [-400]. Training events specific to the 747-8 are annotated with [-8].*

Note 2: *The prerequisites for 747 type rating training are ATPL and operation experience of multiengine transport turbojet airplane.*

Note 3: *For passenger and freighter differences, familiarization training must also address necessary freighter or passenger items, including weight and balance characteristics (e.g. maximum landing mass, CG limits, loading and loadsheet application, cargo securing), and procedures for the occupancy of the Class E cargo compartment (e.g. communication, fire fighting procedures, use of portable oxygen equipment, etc.).*

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

For 747-8I/-8F initial type rating course, the following training areas of special emphasis should be addressed at the appropriate point during the ground and flight training:

- Flight Management System (FMS)
- Navigation Display (ND) and Primary Flight Displays (PFD)
- Electronic Checklist (ECL)
- Flight control system (bank angle and speed/stall protections, FBW system)
- Manual & automatic flight
- EGPWS and Predictive Wind Shear System
- EFB, if installed

For 747-400/-400F to B747-8I/-8F differences course, the following training areas of special emphasis should be addressed at the appropriate point during the ground training (e.g. during CBT and/or FPT training):

- Flight Management System (FMS) new functionality (e.g. alternates function, data link, approach / VNAV / LNAV functions, IAN and GNSS/GLS procedures, etc.)
- Navigation Display (ND) (e.g. Clock function, Airport Moving Map and Vertical Situation Display, ANP/RNP symbology, etc.)
- Electronic Checklist (ECL) (normal, supplementary normal and non-normal functions)
- Flight control system (modes of operation, FBW system, auto-throttle “wake up” function)
- Crosswind take-off limit(s)

Special events training to improve basic crew understanding and confidence regarding aircraft handling qualities, options and procedures as these relate to design characteristics and limitations. Examples of this training should include the following:

- Recovery from unusual attitudes;
- Handling qualities and procedures during recovery from an upset condition (e.g., wake vortex encounter, loss of control incident);
- High altitude high and slow 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);
- Manual flight with minimum use of automation, including flight under degraded levels of automation.

1.5 Specification for Checking

As required by CCAR Part 61 and 121.

When operating more than one 747-400/-400F/-8I/-8F variant:

- Recurrent training and checking on any B747-400/-400F/-8I/-8F variant is valid for all variants operated, provided that the differences between the variants are covered; and
- Recurrent training and checking should be alternated between the variants operated.

1.6 Specification for Currency

As required by CCAR Part 61 and 121.

When operating more than one variant, recency of experience may be accomplished in any 747-400/-400F/-8I/-8F airplanes.

1.7 Specification for Flight Simulation Training Devices

As qualified per CCAR Part 60.

Special device or simulator characteristics are as follows:

- When different EICAS engine display formats are used, due to operation with different engine types (GE and RR), crews should be exposed to the alternate EICAS presentations by some means (e.g. photos, drawings CBT, etc), which would assure proper display interpretation and use by the flight deck crew;
- Training Devices used for recurrent checking is to be accomplished in the relevant 747-4 simulators. Checking and simulator use proposals where simulators do not closely match the related aircraft to be flown are evaluated on a case by case basis by the Principal Inspector. The Principal Inspector may require demonstration of competency in a simulator or the aircraft representing the related aircraft to be flown, when doubt exists regarding training program adequacy, or an airman's preparation or competency.

Section 2: Master Minimum Equipment List

2.1 Statement and Explanation

This section is the formal notification that the CAAC AEG has conducted Flight Operation Evaluation Board (FOEB) evaluation for Boeing 747-8I and 747-8F airplanes based on the Master Minimum Equipment List published by the Federal Aviation Administration (FAA), which outlines the items of equipment that may be inoperative and yet maintain an acceptable level of safety by appropriate conditions and limitations.

Thus, the MMEL and its future revisions published by the FAA can be used, as the basis, by Chinese operators to develop their Minimum Equipment List (MEL) for 747-8I and 747-8F model airplanes.

Find FAA MMEL here:

http://fsims.faa.gov/PICResults.aspx?mode=Publication&doctype=MMEL
747-8I/-8F MMEL is also published by Boeing on MyBoeingFleet website.

2.2 CAAC Supplemental

Not applicable.

Section 3: Maintenance Review Board Report

3.1 Statement and Explanation

This section is the formal notification that the CAAC AEG has conducted Maintenance Review Board (MRB) evaluation for Boeing 747-8I and 747-8F airplanes based on the Maintenance Review Board Report (MRBR) approved by the 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.

Thus, the MRBR and its future revisions approved by the FAA can be used, as the basis, by Chinese operators to develop their maintenance program for 747-8I and 747-8F model airplanes.

MRBR distribution:

Available on MyBoeingFleet website.

3.2 CAAC Supplemental

Not applicable.

Section 4: Operational and Continued Airworthiness Instructions

4.1 Statement and Explanation:

This section is the formal notification that the CAAC AEG has conducted evaluation of the operational and continued airworthiness instructions for Boeing 747-8I and 747-8F airplanes based on the relevant policies and procedures of Boeing.

Thus, the Operational & Continued Airworthiness Instructions document listed in the attachment was found acceptable by the CAAC AEG, and will give the necessary guidance for properly operating and maintaining Boeing 747-8I and 747-8F airplanes within the approved operating conditions and limitations.

This acceptance may not assure the accuracy and applicability of the content in each document, it is the aircraft owner's or operator's responsibility to report any defect or discrepancy in the documents to the aircraft manufacturer, or report to the CAAC AEG through our website: http://aeg.caac.gov.cn/

Operational & Continued Airworthiness Instructions distribution:

Available on MyBoeingFleet website, except engine manuals are directly distributed by the engine manufacturer.

4.2 List of Operational and Continued Airworthiness Instructions for Boeing 747-8I and 747-8F airplanes

Manual	Reference No.	Description	Revision/Date
FCOM	D6-30151-8	Flight Crew Operations Manual	As revised
QRH	D6-30151-8	Quick Reference Handbook	As revised
FCTM	FCT 747 (TM)	Flight Crew Training Manual	As revised
FAM	D900Z022	Flight Attendant Manual	As revised
WBM	D043U582 (8F) / D043U580 (8)	Weight and Balance Manual	As revised
DDG	D639U200-TBC	Dispatch Deviations Guide	As revised
AMM	D633U8101	Airplane Maintenance Manual	As revised
WDM	D280U8XXX	Wiring Diagram Manual	As revised
IPC	D638U025-01	Illustrated Parts Catalog	As revised
IFIM	D633U8103	Interactive Fault Isolation Manual	As revised
MPD	D011U721-02	Maintenance Planning Data Document	As revised
	D011U721-03	Task Cards	As revised

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

***Note 2:** The following documents were approved by type certification process for 747-8I and 747-8F airplane, and must be followed by Chinese operators for operation and maintenance within approved limitations:*

- *AFM: Airplane Flight Manual (D631U004.XXX)*
- *AFM Appendixes:*
  - *CDL : Configuration Deviation List (D631U004-CDL)*
  - *Model 747-8F with General Electric GEnx-2B67 Engines (D631U004-F67F)*
  - *Landing Gear Extended D631U004-LGE*
  - *One-Engine-Inoperative Ferry D631U004-OEIF*
- *Electrical Wiring Interconnection Systems (EWIS) Source Document (EISD)*
- *Airworthiness Limitations (D011U721-02-01)*
- *Airworthiness Limitations - Line Number Specific (D011U721-02-02)*
- *Certification Maintenance Requirements (D011U721-02-03)*
- *Special Compliance Items / Airworthiness Limitations (D011U721-02-04)*
- *747-8F Structural Repair Manual (D634U210)*
- *747-8I Structural Repair Manual (D634U201)*

***Note 3:** 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 4:** Component maintenance procedures may reference Boeing OHM/CMM Index (Doc. No. D6-47081) and it can be found on MyBoeingFleet website.*

***Note 5:** FAA approved emergency evacuation procedure is not included in the FAM. When operators develop their own procedure, Section 6.5 of this document could be referenced*

for more information.

Note 6: *Boeing provides the above manuals, Service Bulletins, Service Letters and other documents in electronic form with e-Notification on MyBoeingFleet website. Refer to MyBoeingFleet for more information.*

Section 5: CCARs Compliance Checklist

5.1 Statement and Explanation:

This section is the formal notification that the CAAC AEG has developed the compliance checklist for Boeing 747-8I and 747-8F airplanes based on the following aircraft configuration:

- FAA Type Certificate Data Sheet No. A20WE, Revision 53, December 10, 2013
- Airplane Flight Manual (D631U004.830), Revision 8, May 8, 2013.

The checklist is provided as an aid to identify those specific requirements for which compliance has already been demonstrated by the type design. The checklist also notes the requirements which remain to be demonstrated compliance by the operators.

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 the compliance to the relevant requirements.

It also remains the responsibility of the operator and it’s PI to evaluate the corrective actions for those items that are not satisfactorily addressed in the compliance checklist prior to approval of the appropriate operation.

5.2 CCAR-91R2 and CCAR-121R4 Compliance Checklist for 747-8I and 747-8F

(1) Basic Requirements

Item	CCAR Ref.	Applicability	Compliance Status	Explanation/*Limitation*
1.1 Aircraft Category	--	747-8I 747-8F	--	Type certified as transport category airplane
	§121.153	747-8I 747-8F	In Compliance	Type certified as transport category airplane
1.2 Minimum Flight Crew	--	747-8I 747-8F	--	Minimum Crew Two (2) persons: pilot and copilot
1.3 Noise limitation	§91.401	747-8I 747-8F	TBD	Compliance was demonstrated for FAR 36, more information to be referenced to TCDS of CAAC VTC
1.4 Fuel Venting and Exhaust Emissions	§91.401	747-8I 747-8F	TBD	Compliance was demonstrated for FAR 34, more information to be referenced to TCDS of CAAC VTC
1.5 Ditching	§121.157	747-8I	In Compliance	
		747-8F	Not applicable	
1.6 Full scale Emergency Evacuation Demonstration	§121.161	747-8I	In Compliance	Compliance demonstrated by analysis during type certification. (Reference Section 6.5 for more information)
		747-8F	Not applicable	747-8F
1.7 Extended range operation with two engine airplanes (ETOPS)	§121 App H	747-8I 747-8F	Not applicable	

(2) Basic Flight Operation

Item	CCAR Ref.	Applicability	Compliance Status	Explanation/*Limitation*
2.1 Visual Flight Rules (VFR) operation	§91.403 §121.305	747-8I 747-8F	In Compliance	VFR operation approved by type certification
2.2 Instrument Flight Rules (IFR) operation	§91.405 §91.409 §121.305 §121.325	747-8I 747-8F	In Compliance	IFR operation approved by type certification
2.3 Night and over-the-top operation	§91.407 §121.323	747-8I 747-8F	In Compliance	Both day and night operation approved by type certification
2.4 Operation in icing conditions	§91.425 §121.341	747-8I 747-8F	In Compliance	Operation in icing conditions approved by type certification

(3) Emergency and life-saving equipment

Item	CCAR Ref.	Applicability	Compliance Status	Explanation/*Limitation*
3.1 Hand fire extinguishers	§91.415 §121.309	747-8I	Optional Compliance	The flight compartment includes a halon fire extinguisher. Passenger fire extinguishers are available by customer selection. Galley fire extinguishers are available by customer selection.
		747-8F	In Compliance	The flight compartment includes a halon fire extinguisher. The supernumerary includes a halon fire extinguisher and a water fire extinguisher.

Item	CCAR Ref.	Applicability	Compliance Status	Explanation/*Limitation*
3.2 Seat and Safety belt	§91.415 §121.311	747-8I	Optional Compliance	The pilot and observer seats have crotch straps, lap belts and inertial-reel shoulder harnesses with manual locks. The attendant seats have an adjustable shoulder harness with a single-point release from a single buckle. Passenger and cabin crew seats will be installed in accordance with the buyer`s interior arrangement.
		747-8F	In Compliance	The pilot and observer seats have crotch straps, lap belts and inertial-reel shoulder harnesses with manual locks. The airplane is equipped with the appropriate seats and safety belts.
3.3 Sign or Instruction	§91.415 §121.309 §121.317 §121.361	747-8I 747-8F	Optional Compliance	Placards and markings supply information on operating instructions, installation instructions, servicing instructions, position identification, rescue and escape instructions and safety precautions. Bilingual placards and markings are available by customer selection.
3.4 Spare electrical fuses or Protective fuses	§91.415 §121.313	747-8I 747-8F	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	747-8I 747-8F	Option Compliance	Chop out areas are located at the top of the fuselage and below the windows between the wing front spar and escape hatch. The locations are shown in the airplane rescue and fire fighting information
3.6 Crash axe	§91.415 §121.309	747-8I	In Compliance	The flight compartment contains one crash ax.
		747-8F	Not Applicable	The supernumerary compartment accommodates up to six supernumeraries.

Item	CCAR Ref.	Applicability	Compliance Status	Explanation/*Limitation*
3.7 Portable megaphone	§91.415 §121.309	747-8I	Option Compliance	Emergency equipment will be installed to comply with the Customer's interior arrangement. Battery powered megaphones are available to meet this requirement.
		747-8F	Not Applicable	The supernumerary compartment accommodates up to six supernumeraries.
3.8 Public address systems	§121.318	747-8I	In Compliance	The cabin services system (CSS) includes a passenger address (PA) system
		747-8F	Not Applicable	The supernumerary compartment accommodates up to six supernumeraries.
3.9 Crewmember interphone system	§121.319	747-8I	In Compliance	The cabin interphone system (CIS) enables communication among the flight compartment and several cabin interphone stations. It meets all the requirements of this category. The cabin interphone system (CIS) enables communication among the flight compartment and several cabin interphone stations.
		747-8F	Not Applicable	The supernumerary compartment accommodates up to six supernumeraries. A digitally controlled flight interphone system enables communication between flight crew members in the flight compartment and between the flight crew and ground crew.

Item	CCAR Ref.	Applicability	Compliance Status	Explanation/*Limitation*
3.10 Life jacket or equivalent flotation device	§91.417 §91.419 §121.339	747-8I 747-8F	Optional compliance for over water Operation	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.
		747-8I 747-8F	Optional compliance for Extended Overwater Operation	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	747-8I 747-8F	Not applicable	
3.12 Anchor	§91.417	747-8I 747-8F	Not applicable	
3.13 Life raft	§91.417 §91.419 §121.339	747-8I	Optional compliance for Extended Overwater Operation	The airplane is equipped with slide/raft sufficient to cover rated capacity of 420 passengers. If the airplane is configured for more than 420 passengers, a customer selection is required. Each slide/raft contains a pyrotechnic signaling device and a survival kit. The airplane includes a life preserver equipped with a survivor locator light for each occupant of the airplane.
		747-8F	Compliance for Extended Overwater Operation	The supernumerary compartment contains two slide/raft. Each slide/raft contains a pyrotechnic signaling device and a survival kit. The airplane includes a life preserver equipped with a survivor locator light for each occupant of the airplane.

Item	CCAR Ref.	Applicability	Compliance Status	Explanation/*Limitation*
3.14 Pyrotechnic signaling device	§91.417 §91.421 §121.339 §121.353	747-8I 747-8F	In Compliance	A separate pouch attached to each slide-raft contains two day-night signal flares.
3.15 Flotation equipment	§91.419	747-8I 747-8F	Not applicable	
3.16 Life-saving equipment (including means of sustaining life)	§91.419 §91.421 §121.339 §121.353	747-8I 747-8F	Optional compliance	Life-saving equipment is available by customer selection.
3.17 Oxygen equipment	§91.423 §121.327 §121.329 §121.331 §121.333	747-8I 747-8F	Compliance for flight compartment oxygen requirements; Optional compliance for passenger oxygen requirements	A flight compartment oxygen system provides sufficient oxygen for one pilot for a minimum of six hours for normal flight with a cabin pressure equivalent of 8,000 feet, plus sufficient oxygen for all occupants of the flight compartment stations in the event of an emergency descent following a decompression and using a Boeing-approved descent profile. The baseline passenger oxygen system has three high-pressure 115-cubic-foot oxygen cylinders. Customer selections provide additional passenger oxygen. Portable oxygen is available by customer selection. The captain and first officer stations have full-face oxygen masks

Item	CCAR Ref.	Applicability	Compliance Status	Explanation/*Limitation*
3.18 Emergency locator transmitter (ELT)	§91.435	747-8I	In Compliance	One automatic fixed ELT and two portable survival-type ELTs are provided. The portable ELT requires a customer selection for proper coding.
		747-8F	In Compliance	One automatic fixed ELT is provided and portable survival-type ELTs are selected by the customer. Note: The total occupancy of the flight compartment and supernumerary compartment is limited to eight persons to comply with emergency egress requirements. The portable ELT requires a customer selection for proper coding.
	§121.339	747-8I	Compliance for Extended Overwater Operation	One automatic fixed ELT and two portable survival-type ELTs are provided. The portable ELT requires a customer selection for proper coding.
		747-8F	Optional compliance for Extended Overwater Operation	One automatic fixed ELT and one portable survival-type ELT is provided. The portable ELT requires a customer selection for proper coding.
	§121.353	747-8I	Compliance or operations over uninhabited terrain or survival difficult areas	One automatic fixed ELT and two portable survival-type ELTs are provided. The portable ELT requires a customer selection for proper coding.

Item	CCAR Ref.	Applicability	Compliance Status	Explanation/*Limitation*
		747-8F	Optional compliance or operations over uninhabited terrain or survival difficult areas	One automatic fixed ELT and one portable survival-type ELT is provided. The portable ELT requires a customer selection for proper coding.
	§91.435	747-8I 747-8F	In Compliance	When activated, the ELT transmits on three frequencies: 243 MHz, 121.5 MHz, and 406 MHz.
3.19 Flashlight	§121.310	747-8I	Optional compliance	Flashlights are available by customer selection.
		747-8F	Not applicable	There are no cabin crew seats.
3.20 Lavatory fire protection	§121.308	747-8I 747-8F	In Compliance	Each lavatory includes a smoke detector that meets these requirements. Each lavatory also includes a fire extinguisher for the waste compartments.
3.21 Protective breathing equipment	§121.337	747-8I 747-8F	Optional compliance	A customer selection is required to install protective breathing equipment in the flight compartment, supernumerary compartment and passenger compartment.

(4) Communication, Navigation and Surveillance Equipment

Item	CCAR Ref.	Applicability	Compliance Status	Explanation/*Limitation*
4.1 Basic radio communication and navigation equipment	§91.411 §91.413	747-8I 747-8F	In Compliance	The airplane includes two HF systems, three VHF systems and one SATCOM system.
4.2 Radio communication and navigation equipment for CCAR-135 operation	§135.169	--	--	--
	§135.173	--	--	--

Item	CCAR Ref.	Applicability	Compliance Status	Explanation/*Limitation*
4.3 Radio communication and navigation equipment for CCAR-121 operation	§121.345 §121.347 §121.349 §121.351	747-8I 747-8F	In Compliance	The airplane includes two HF systems, three VHF systems and one SATCOM system. Navigation systems include two VOR/marker beacon systems, two Change 7-compliant ATC transponder systems, two DME systems and one GPS.
4.4 ATC transponder	§91.427 §121.345	747-8I 747-8F	In Compliance	Two ARINC 718A Change 7-compliant ATC/Mode S systems are installed
4.5 Air ground two way data link communication system	§121.346	747-8I 747-8F	In Compliance	ACARS functionality is provided. An ARINC 758 communications management unit (CMU) that provides the ACARS functionality is installed. The CMU provides management of data link messages in the airplane and access to the ground data link networks and services available to the airplane. The system supports plain old ACARS (POA), ACARS over AVLC (AOA), and Aeronautical Telecommunications Network (ATN).
4.6 Equipment for operations use specialized means of navigation	§121.355 §121 App. I	747-8I 747-8F	In Compliance	An ARINC 738A air data inertial reference system (ADIRS) that includes three ADIRS units (left, right and center) provides air data and inertial reference information to the flight compartment instruments and other systems.
4.7 Altitude holding and warning system	§91.429 §121.320	747-8I 747-8F	In Compliance	The autopilot/flight director system has an altitude heading select and hold, and an alerting function.
4.8 Airborne thunderstorm detection equipment	§135.179	--	--	--

Item	CCAR Ref.	Applicability	Compliance Status	Explanation/*Limitation*
4.9 Weather radar	§91.431 §121.357	747-8I 747-8F	In Compliance	A dual ARINC 708A weather radar (WXR) system with predictive wind shear (PWS) capability displays significant weather in front of the airplane during flight
4.10 Terrain awareness and warning system（TAWS）Ground proximity warning / glide slope deviation alerting system	§91.437 §121.354 §121.360	747-8I 747-8F	In Compliance	An ARINC 762 enhanced ground proximity warning system (EGPWS) alerts or warns the flight crew of unsafe terrain clearance
4.11 Traffic Alert and Collision Avoidance equipment	§91.439 §121.356	747-8I 747-8F	In Compliance	An ARINC 735 traffic alert and collision avoidance system (TCAS) is installed. The system is TCAS Change 7 compliant.
4.12 Low altitude windshear system equipment	§121.358	747-8I 747-8F	In Compliance	Windshear aural alerts, visual alerts, and guidance features are installed. The system gives visual alerts on the primary flight display (PFD) and aural alerts through the flight compartment loudspeakers. The windshear system supplies flight director guidance.
4.13 Radiation indicator	§91.441	747-8I 747-8F	Not applicable	The maximum operating altitude is 43,100 feet pressure altitude.

Item	CCAR Ref.	Applicability	Compliance Status	Explanation/*Limitation*
4.14 Required navigation performance	§91.413	747-8I 747-8F	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	747-8I 747-8F	In Compliance for RNAV1, 2, 5 and RNP 0,3, 2, 10 operation	The flight management computer system (FMCS) has been shown to meet the requirements for primary means RNAV and RNP operations with the equipment listed in the AFM operational at departure.
4.15 Low visibility operation	§91.413 §91 App B AC-91-18	747-8I 747-8F	In Compliance for Category I, II, IIIa and IIIb approach operation	The airplane has FAA certification for low-weather minimum operations.
	AC-91-03R1 AC-91-15 AC-91-16	747-8I 747-8F	Not In Compliance	This airplane does not have HUD or EVS
4.16 ADS-B	AC-91-14	747-8I 747-8F	In Compliance	Extended squitter transmissions have been demonstrated for proper operation for broadcast of ADS-B related position information, with the following exception: The extended squitter transmission system does not take into account the system's uncompensated latency into its transmitted horizontal quality indicator value
4.17 SATCOM	AC-121-004R1	747-8I 747-8F	In Compliance	An ARINC 781 satellite communication (SATCOM) system provides flight compartment voice and data communication capability between the airplane and ground stations when operating in remote areas.

(5) Record Equipment

Item	CCAR Ref.	Applicability	Compliance Status	Explanation/*Limitation*
5.1 Flight recorder	§91.433 §121.343	747-8I 747-8F	In Compliance	An ARINC 717 flight data recorder system (FDRS) records and stores data for the last 25 hours of flight.
	§91.433 §121.343 §121.359	747-8I 747-8F	In Compliance	An ARINC 757 solid-state flight compartment voice recorder system with two-hour voice and data link recording time records the flight crew voices from the audio control panels and other sounds inside the flight compartment using the flight compartment area microphone
	§91.433	747-8I 747-8F	In Compliance	A communication management unit (CMU) with data link capability can send messages to the cockpit voice recorder (CVR) for data link recording.
5.2 Quick Access Recorder or equivalent equipment	§121.344	747-8I 747-8F	In Compliance	The integrated digital management unit (IDMU) has QAR built into it. A wireless quick access recorder is available by customer selection

(6) Other Requirements

Item	CCAR Ref.	Applicability	Compliance Status	Explanation/*Limitation*
6.1 Forward Observer's seat	§121.589	747-8I 747-8F	In Compliance	The airplane has two observer seats in the flight compartment, both with boom microphone headset.
6.2 Airspeed indicator	§121.301	747-8I 747-8F	In Compliance	
6.3 Altitude indicator	§121.301	747-8I 747-8F	In Compliance	Altitude is displayed in feet and can be displayed in meters when the electronic flight instrument system (EFIS) MTRS switch is set

Item	CCAR Ref.	Applicability	Compliance Status	Explanation/*Limitation*
6.4 Flight deck door	§121.313	747-8I	In Compliance	There is a door between the flight compartment and the passenger compartment that includes an electronic door latching system and access keypad. The door complies with the intrusion and ballistics characteristics defined in 25.795
		747-8F	Not applicable	
6.5 Space of passenger seats	§121.213	747-8I	Optional Compliance	Passenger and cabin crew seats will be installed in accordance with the buyer`s interior arrangement.
		747-8F	Not applicable	
6.6 Carriage of cargo in passenger compartments	§121.215	747-8I 747-8F	Not Applicable	Neither the 747-8I nor the 747-8F are designed to carry both passengers and cargo in the same compartment.
6.7 Carriage of cargo in cargo compartments	§121.217	747-8I	Not Applicable	
		747-8F	Not Applicable	The main deck cargo compartment is a FAR Class E compartment. Fire is suppressed by shutting off supply air to the cargo compartments which suppresses the fire through oxygen deprivation. The airplane is also depressurized to aid in fire suppression. The lower deck cargo holds are FAR Class C compartments. Each lower hold cargo compartment has a fire extinguishing system. The system contains enough extinguishing agent to suppress a fire in the lower holds for a minimum of 210 minutes.

Section 6: Other Evaluation Items

6.1 Forward Observer Seat

Based on the FAA FSB Report and compliance statement submitted by Boeing, CAAC AEG has concluded that the Forward Observer's Seat of Boeing 747-8I and 747-8F 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 Principal Inspector (PI) and requires submittal of the following to the CAAC: additional analysis, demonstrations, proof of concept testing, differences documentation, or other supporting evidence as required.

6.2 Flight Crew Sleeping Quarters

Based on the FAA FSB Report and compliance statement submitted by Boeing, the CAAC AEG has concluded that the Flight Crew Rest (FCR) facility of Boeing 747-8I and 747-8F are considered to have met the requirements of AC-121-008.

However specific operational approval for an operator to use the FCR is still required, and the following requirements should be considered:

Occupancy

The basic design all of crew rests (on both 747-8I and 747-8F airplanes) are in-flight use only, and only approved crewmembers, trained in FCR evacuation procedures, may occupy the FCR. Clear definition of "crewmembers" allowed to occupy the FCR must be specified in the operational approval to use this facility.

Rescue and Emergency Evacuation

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

- For planned evacuations, FCR occupants should be relocated to the upper deck/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 FCR on board. This information should include the number of occupants and the location of the FCR onboard.
- At least one cabin crew member is given responsibility to ensure occupants of the FCR are evacuated if an evacuation command is given.

Training - Occupants

As a minimum, prior to occupying the FCR, crewmembers must be familiarized with the conditions for occupancy and the safety provisions and equipment of the FCR facility.

The FCR familiarization to include the following:

- Maximum allowable occupancy for TTL and in flight
- Fire extinguishers and smoke hoods (fire fighting 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

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

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

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

Note: *For overhead flight attendant rest (OFAR), additional emergency evacuation training requirements (and AFM limitations) is required based on the FAA special conditions.*

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

6.3 Electronic Flight Bag

Class 3 Electronic Flight Bag (EFB) Block Point 4 is an optional configuration on Boeing 747-8I and 747-8F airplanes.

This paragraph is the formal statement that the CAAC AEG has validated the Flight Standardization Board Report (FSBR) for Boeing Class 3 Electronic Flight Bag (EFB) Block Point 4 issued by the FAA, which gives the operation procedure, data revision process, pilot training, checking, and currency specifications for operating applicable Boeing Airplane using

the EFB.

The specific operational approval for an operator to use the EFB is still required.

Find FAA FSB Report here:

http://fsims.faa.gov/PICResults.aspx?mode=Publication&doctype=FSB%20Reports

6.4 Head-up Display/Enhanced Flight Vision System

Not applicable.

6.5 Emergency Evacuation Demonstration for 747-8I

747 Series airplane full capacity emergency evacuation demonstration has been conducted in the early 1970s. When the 747-8I was type certificated, the dark of night evacuation rate test for Door 1 and Upper Deck were conducted. 747-8I compliance was shown by analysis based on 747 Series airplane.

As concluded by reference to the FAA determination, CAAC AEG considers 747-8I has been shown to be in compliance with the full capacity emergency evacuation demonstration for passenger limitation of 605 (495 for Main Deck and 110 for Upper Deck) during the type certification process.

Note: *The Boeing Flight Attendant Manual (FAM) for 747-8I only provides evacuation system component description and evacuation guidelines. Boeing offers a supplemental document "747-8 Emergency Evacuation General Procedures" to further assist operators in developing their own evacuation procedures.*

Appendix: CAAC AEG Team and Point of Contact

A: CAAC AEG Final Evaluation Team

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