



U.S. Department of Transportation
Federal Aviation Administration
Washington, DC

Flight Standardization Board (FSB) Report

Revision: 6
Date: 12/06/2018

Manufacturer
Embraer S.A.

Type Certificate Data Sheet (TCDS)	TCDS Identifier	Marketing Name	Pilot Type Rating
A56NM	ERJ 170-100	Embraer 170	ERJ-170
A56NM	ERJ 170-200	Embraer 175	ERJ-170

Approved by: Transport Aircraft Seattle Branch
Federal Aviation Administration (FAA)
Aircraft Evaluation Division
2200 S. 216th St, 2nd Floor, North Wing
Des Moines, WA 98198

Office Telephone: (206) 231-3950
Office Email: 9-AVS-AFS-100@faa.gov

TABLE OF CONTENTS

Section	Page
1 RECORD OF REVISIONS	3
2 INTRODUCTION	3
3 HIGHLIGHTS OF CHANGE	4
4 BACKGROUND	4
5 ACRONYMS.....	4
6 DEFINITIONS.....	6
7 PILOT TYPE RATING	7
8 RELATED AIRCRAFT.....	7
9 PILOT TRAINING.....	7
10 PILOT CHECKING.....	10
11 PILOT CURRENCY	11
12 OPERATIONAL SUITABILITY.....	12
13 MISCELLANEOUS	12
APPENDIX 1. DIFFERENCES LEGEND	13
APPENDIX 2. MASTER DIFFERENCES REQUIREMENTS (MDR) TABLE.....	15
APPENDIX 3. DIFFERENCES TABLES	16
APPENDIX 4. EXAMPLE HEAD-UP DISPLAY TRAINING PROGRAM	74
APPENDIX 5. EMBRAER E1 eQRH.....	78

1 RECORD OF REVISIONS

Revision Number	Section(s)	Date
Original	All	04/05/2004
1	N/A	09/29/2005
2	N/A	08/10/2010
3	1, 2, 5, 6, 9, 10, Appendices 1 and 4	04/11/2014
4	All	05/03/2016
5	All (ERJ 170 and ERJ 190 FSR separated)	12/15/2017
6	1, 3, 4, 5, 8.2, 9.2, 9.8, 10.1, 12, Appendix 2, Appendix 2, Appendix 3, Appendix 5	12/06/2018

2 INTRODUCTION

- 2.1** Aircraft Evaluation Groups (AEG) are responsible for working with aircraft manufacturers and modifiers during the development and Federal Aviation Administration (FAA) certification of new and modified aircraft to determine: 1) the pilot type rating; 2) flightcrew member training, checking, and currency requirements; and 3) operational suitability.
- 2.2** This report lists those determinations for use by: 1) FAA employees who approve training programs; 2) FAA employees and designees who certify airmen; and 3) aircraft operators and training providers to assist them in developing their flightcrew member training, checking, and currency.

3 HIGHLIGHTS OF CHANGE

The purpose of revision 6 is to add the ERJ 190-300 (Embraer 190 E2) as a related aircraft as per Appendix 2, Master Differences Requirements (MDR) Table, which has been updated with the ERJ 190-300 Training and Checking Levels. It also harmonizes the wording under item 10.7 with the MDR/DT specifications and deletes the item 13.4 similarly as done on the ERJ 190 series Flight Standardization Board (FSB) report revision 6. Lastly, the Differences Tables under Appendix 3 have been updated to include the optional features INAV, 3D Volumetric Weather Radar, Electronic Charts & Maps.

4 BACKGROUND

The Transport Aircraft Seattle Branch formed an FSB that evaluated the Embraer ERJ 170-100 and ERJ 170-200 aircraft as defined in FAA Type Certificate Data Sheet (TCDS) #A56NM. The evaluation was conducted during April 2004 using the methods described in the current edition of FAA Advisory Circular (AC) 120-53, Guidance for Conducting and Use of Flight Standardization Board Evaluations.

5 ACRONYMS

14 CFR	Title 14 of the Code of Federal Regulations
AC	Advisory Circular
ACS	Airman Certification Standards
AEG	Aircraft Evaluation Group
AFM	Aircraft Flight Manual
AGL	Above Ground Level
AOA	Angle of Attack
AOM	Airplane Operations Manual
AR	Authorization Required
ATP	Airline Transport Pilot
CAT	Category
CBT	Computer-Based Training
COTS	Commercial-off-the-Shelf
CPDLC	Controller-Pilot Data Link Communications
DH	Decision Height
DT	Differences Table
E1	ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-100 ECJ, ERJ 190-200
E2	ERJ 190-300
EFB	Electronic Flight Bag
EICAS	Engine Indicating and Crew Alerting System
eQRH	Electronic Quick Reference Handbook
FAA	Federal Aviation Administration
FADEC	Full-Authority Digital Engine Control
FAF	Final Approach Fix
FANS	Future Air Navigation System

FD	Flight Director
FFS	Full Flight Simulator
FGCS	Flight Guidance Control System
FMS	Flight Management System
FSB	Flight Standardization Board
FSTD	Flight Simulation Training Device
FTD	Flight Training Device
HGS	Head-Up Guidance System
HUD	Head-Up Display
ILS	Instrument Landing System
IMC	Instrument Meteorological Conditions
INAV	Interactive Navigation
MCDU	Multipurpose Control Display Unit
MDA	Minimum Descent Altitude
MDR	Master Differences Requirements
MEL	Minimum Equipment List
MFD	Multifunction Display
MFF	Mixed Fleet Flying
NAS	National Airspace System
NG-FMS	Next Generation Flight Management System
NM	Nautical Mile
OE	Operating Experience
OpSpec	Operation Specification
OPT	Option
PED	Portable Electronic Device
PF	Pilot Flying
PFD	Primary Flight Display
PIC	Pilot in Command
PM	Pilot Monitoring
POI	Principal Operations Inspector
PTS	Practical Test Standards
QRH	Quick Reference Handbook
RNP AR	Required Navigation Performance Authorization Required
RNP	Required Navigation Performance
RVR	Runway Visual Range
SIC	Second in Command
SVS	Synthetic Vision System
TCDS	Type Certificate Data Sheet
TCPM	Training Center Program Manager
VMC	Visual Meteorological Conditions
VOR	Very High Frequency Omnidirectional Range

6 DEFINITIONS

These definitions are for the purposes of this report only.

- 6.1 **Base Aircraft.** An aircraft identified for use as a reference to compare differences with another aircraft.
- 6.2 **Current.** A crewmember meets all requirements to operate the aircraft under the applicable operating part.
- 6.3 **Differences Tables.** Describe the differences between a pair of related aircraft and the minimum levels operators must use to conduct differences training and checking of crewmembers. Difference levels range from A to E.
- 6.4 **Master Differences Requirements (MDR).** Specifies the highest training and checking difference levels between a pair of related aircraft derived from the Differences Tables.
- 6.5 **Mixed Fleet Flying.** The operation of a base aircraft and one or more related aircraft for which credit may be taken for training, checking, and currency events.
- 6.6 **Operational Evaluation.** An AEG process to determine pilot type rating, minimum crewmember training, checking, and currency requirements, and unique or special airman certification requirements (e.g., specific flight characteristics, no-flap landing).
- 6.7 **Operational Suitability.** An AEG determination that an aircraft or system may be used in the National Airspace System (NAS) and meets the applicable operational regulations (e.g., Title 14 of the Code of Federal Regulations (14 CFR) parts 91, 121, 133, 135).
- 6.8 **Qualified.** A crewmember holds the appropriate airman certificate and ratings as required by the applicable operating part.
- 6.9 **Related Aircraft.** Any two or more aircraft of the same make with either the same or different type certificates that have been demonstrated and determined by the Administrator to have commonality.
- 6.10 **Seat Dependent Tasks.** Maneuvers or procedures using controls that are accessible or operable from only one flightcrew member seat.
- 6.11 **Special Emphasis Area.** A training requirement unique to the aircraft, based on a system, procedure, or maneuver, which requires additional highlighting during training. It may also require additional training time, specialized training devices, or training equipment.
- 6.12 **Specific Flight Characteristics.** A maneuver or procedure with unique handling or performance characteristics that the FSB has determined must be checked.

7 PILOT TYPE RATING

- 7.1** Type Rating. The ERJ 170-100 and ERJ 170-200 type rating designation is ERJ-170.
- 7.2** Common Type Ratings. In accordance with the provisions of FAA Order 8900.1 and AC 120-53, the ERJ 170 and the ERJ 190 are considered to have type ratings in common.
- 7.3** Military Equivalent Designations. Military aircraft that qualify for the ERJ-170 can be found on the faa.gov website under Licenses and Certificates, Airmen Certification, Online Services, Aircraft Type Rating Designators. This webpage is kept up-to-date and can be found at http://www.faa.gov/licenses_certificates/airmen_certification.

8 RELATED AIRCRAFT

- 8.1** Related Aircraft on Same TCDS. The ERJ 170-100 aircraft is related to the ERJ 170-200 aircraft.
- 8.2** Related Aircraft on Different TCDS. The ERJ 170-100 and ERJ 170-200 are related to the ERJ 190-100, ERJ 190-100 ECJ, ERJ 190-200, and ERJ 190-300 aircraft.

9 PILOT TRAINING

- 9.1** Airman Experience. The provisions of this section apply to all ERJ 170 training programs, and assume the training will be given to airmen with previous experience. Examples of applicable previous experience may include any of the following: experience in 14 CFR parts 121 or 125 air carrier operations, former military, commuter, or corporate pilots with turbine powered aircraft experience, etc. For airmen not having such experience (e.g., recent “ab initio” program graduates), additional requirements may be necessary as determined by the Principal Operations Inspector (POI), FSB, and the Air Transportation Division.
- 9.2** Special Emphasis Areas.

Pilots must receive special emphasis on the following areas during ground training:

- Engine indicating and crew alerting system (EICAS), primary flight displays (PFD), and multifunction displays (MFD), Altitude and airspeed are presented on vertical scale instruments in both digital and analog formats. Pilots must be given academic training of the information presented on these displays. This item must be included in initial, upgrade, transition, and recurrent training.
- Flight control system. An academic understanding of normal and direct modes of operation of the fly-by-wire primary and secondary flight control systems and their associated system components. This item must be included in initial, upgrade, transition, and recurrent training.

- Flight guidance control system (FGCS), including the autopilot, autothrottle, and flight director (FD). An academic understanding of the various lateral and vertical modes and the ability to select and arm the modes during different phases of flight is essential. This item must be included in initial, upgrade, transition, and recurrent training.
- Full-authority digital engine control (FADEC). An academic understanding of the FADEC and the engine thrust mode selection is required. This item must be included in initial, upgrade, transition, and recurrent training.
- System control panels using pushbuttons with integral light bars. Pilots should have an understanding of the switch position and system configuration as it relates to whether the light bar is illuminated or not. This understanding is required for both normal and abnormal system operation. This item must be included in initial, upgrade, transition, and recurrent training.
- Head-Up Display (HUD). If HUDs are installed and used, training in accordance with Appendix 4, Example Head-Up Display Training Program, should be provided. This item must be included in initial, upgrade, transition, and recurrent training.

Pilots must receive special emphasis on, and perform the following areas during, flight training:

- EICAS, PFDs, and MFDs. Altitude and airspeed are presented on vertical scale instruments in both digital and analog formats. Pilots need to be able to understand the information presented on these displays. Pilots transitioning from traditional round dial basic “T” instruments may require additional flight training and instrument scan practice to gain proficiency in manually flying by reference to the PFD. Recognition of reversionary modes and display failures and appropriate corrective action to be taken should be addressed. This item must be included in initial, upgrade, transition, and recurrent training.
- Flight control system. An operational understanding of normal and direct modes of operation of the fly-by-wire primary and secondary flight control systems and their associated system components. This item must be included in initial, upgrade, transition, and recurrent training.
- FGCS, including the autopilot, autothrottle, and FD. An understanding of the various lateral and vertical modes and the ability to select and arm the modes during different phases of flight is essential. This item must be included in initial, upgrade, transition, and recurrent training.
- FADEC. An operational understanding of the FADEC and the engine thrust mode selection is required. This item must be included in initial, upgrade, transition, and recurrent training.

- System control panels using pushbuttons with integral light bars. Pilots should have an operational understanding of the switch position and system configuration as it relates to whether the light bar is illuminated or not. This training is required for both normal and abnormal system operation. This item must be included in initial, upgrade, transition, and recurrent training.
- HUD. If HUDs are installed and used, training in accordance with Appendix 4 should be provided. This item must be included in initial, upgrade, transition, and recurrent training.

9.3 Specific Flight Characteristics.

Maneuvers/procedures required to be checked are referenced in the airline transport pilot (ATP) and aircraft type rating practical test standards (PTS) for airplane and/or part 121 appendix F. There are no specific flight characteristics.

9.4 Seat Dependent Tasks.

Pilots must receive training in these seat dependent tasks:

- HUD (left seat); initial, transition, upgrade, and recurrent training.
- Manual landing gear extension (right seat); initial, transition, and recurrent training.
- Nosewheel steering (left seat); initial, transition, upgrade, and recurrent training.

9.5 Regulatory Training Requirements which are Not Applicable to the ERJ 170 Aircraft (part 121 appendix E).

- Tuck and Mach buffet. Demonstration of the aircraft's overspeed protection capabilities is an acceptable substitute.
- Operation of systems and controls at the flight engineer station. No substitute required.
- Fuel jettisoning. No substitute required.

9.6 Flight Simulation Training Devices (FSTD).

There are no specific systems, procedures, or maneuvers that are unique to the ERJ 170 that require a specific FSTD for training.

9.7 Training Equipment.

There are no specific systems or procedures that are unique to the ERJ 170 aircraft that require specific training equipment.

9.8 Differences Training between Related Aircraft.

Pilots must receive differences training between the ERJ 170-100 aircraft and ERJ 170-200 aircraft. The level of training is specified in Appendix 3.

Pilots must receive related aircraft differences training between the applicable ERJ 170 aircraft variation and the applicable ERJ 190 aircraft variation. The level of training is specified in Appendix 3.

9.9 Other Training Items.

9.9.1 Required Navigation Performance (RNP) Procedures with Authorization Required (AR). RNP AR operation is applicable to aircraft equipped with certified Primus EPIC Load 23.1, with not less than 0.3 nautical miles (NM) for approach and not less than 1.0 NM for missed approach. EPIC Load 27.1 (or later) together with next generation flight management system (NG-FMS) is required for RNP AR less than 0.3 NM for approach and/or less than 1.0 NM for missed approach.

Ground training for flightcrews current in the ERJ 170 aircraft was evaluated by an instructor-led course and should include subjects required by the current edition of AC 90-101, Approval Guidance for RNP Procedures with AR.

Flight training for flightcrews current in the ERJ 170 aircraft was validated with a Level D full flight simulator (FFS). The FSB has determined that the operator may conduct required flight training modules in a Level 6 flight training device (FTD) that replicates the operator's equipment and RNP AR approach operations. Specific flight training items can be found in AC 90-101.

9.9.2 Controller-Pilot Data Link Communications (CPDLC). The FSB has established ground training requirements at Level B as outlined in Appendix 3.

NOTE: There are two different implementations for CPDLC: *pre Load 27.1* (continental use only) and *post-Load 27.1* (also called Future Air Navigation System (FANS) 2, it includes oceanic capacity and integration with FMS). The recommendations described in this FSB report are applicable to both implementations. In addition, once a pilot has completed the training for either one of the CPDLC implementations (*pre* or *post Load 27.1*), the transition to the other version may be accomplished through self-learning, Level A training.

9.9.3 Recurrent training. For operators who are conducting mixed fleet flying between the ERJ 170-100 or ERJ 170-200 and ERJ 190-300 aircraft, pilots are required to complete Level B recurrent training and are not required to complete ERJ 190-300 FTD-based recurrent training when the recurrent training curriculum is administered under 14 CFR parts 91 subpart K, 121, or 135.

10 PILOT CHECKING

10.1 Landing from a No-Flap or Nonstandard Flap Approach.

The probability of a flap extension failure on the ERJ 170 aircraft is not extremely remote due to system design. Therefore, demonstration of a no-flap approach and landing during pilot certification is required. During a 14 CFR part 61, § 61.58 proficiency check,

§ 91.1065 competency check, § 121.441 proficiency check, § 125.287 competency check, or a § 135.293 competency check, this task may be required. Refer to FAA Order 8900.1, Volume 5 when the test or check is conducted in an aircraft versus an FFS.

10.2 Specific Flight Characteristics.

Maneuvers/procedures required to be checked are referenced in the ATP and aircraft type rating PTS for airplane and/or of part 121 appendix F. There are no specific flight characteristics.

10.3 Seat Dependent Tasks.

Pilots must be checked in these seat dependent tasks:

- a) HUD (left seat); initial, transition, upgrade, differences, and recurrent checking.
- b) Nosewheel steering (left seat), initial, transition, upgrade, differences, and recurrent checking.

10.4 Other Checking Items (When Applicable).

- a) Localizer Performance with Vertical guidance (LPV) approach, recurrent checking.
- b) CPDLC, initial and recurrent checking.
- c) RNP AR, initial and recurrent checking.

10.5 FSTDs.

There are no specific systems, procedures, or maneuvers that are unique to the ERJ 170 that require a specific FSTD for checking.

10.6 Equipment.

There are no specific systems or procedures that are unique to the ERJ 170 aircraft that require specific equipment.

10.7 Differences Checking between Related Aircraft.

There are no differences checking requirements between the ERJ 170-100 and ERJ 170-200 aircraft.

Pilots must receive differences checking between the ERJ 170 and the ERJ 190 aircraft. The level of checking is specified in Appendix 3.

11 PILOT CURRENCY

There are no additional currency requirements for the ERJ 170 other than those already specified in parts 61, 121, 125, and 135.

11.1 Differences Currency between Related Aircraft.

There are no differences currency requirements between the ERJ 170-100 and ERJ 170-200 aircraft. There are no differences currency requirements for part 121 mixed fleet flying of the ERJ 170 aircraft variation and ERJ 190 aircraft variation. Takeoff and landing credit may be permitted between the ERJ 170 and ERJ 190. Takeoffs and landings performed in one aircraft type are equivalent to those performed in the other aircraft type.

12 OPERATIONAL SUITABILITY

The ERJ 170 aircraft is operationally suitable for operations under parts 91, 121, 125, and 135. The list of operating rules evaluated is on file at the Transport Aircraft Seattle Branch.

13 MISCELLANEOUS

13.1 Forward Observer Seat.

The ERJ 170 aircraft forward observer seat, as installed by TCDS #A56NM, has been evaluated and determined to meet the requirements of §§ 121.581(a), 125.317(b), and 135.75(b) and the current edition of AC 120-83, Flight Deck Observer Seat and Associated Equipment.

13.2 Landing Minima Categories (Reference Part 97, § 97.3).

The ERJ 170 aircraft is considered Category C aircraft for the purposes of determining “straight-in landing weather minima”.

13.3 Emergency Evacuation.

A full-scale emergency evacuation was successfully completed on the ERJ 170-100 aircraft by Embraer. The aircraft was configured with 78 passenger seats and two flight attendants. The demonstration complied with § 121.291(a).

An emergency evacuation by analysis was successfully completed on the ERJ 170-200 aircraft by Embraer. The aircraft was configured with 88 passenger seats and two flight attendants. The analysis complied with § 121.291(a).

13.4 Normal Landing Flaps.

The ERJ 170 aircraft normal “final landing flap setting” per § 91.126(c) are Flaps 5 and Flaps FULL settings.

APPENDIX 1. DIFFERENCES LEGEND

Training Differences Legend

Differences Level	Type	Training Method Examples	Conditions
A	Self-Instruction	<ul style="list-style-type: none"> • Operating manual revision (HO) • Flightcrew operating bulletin (HO) 	<ul style="list-style-type: none"> • Crew has already demonstrated understanding on base aircraft (e.g. updated version of engine). • Minor or no procedural changes required. • No safety impact if information is not reviewed or is forgotten (e.g. different engine vibration damping mount). • Once called to attention of crew, the difference is self-evident.
B	Aided Instruction	<ul style="list-style-type: none"> • Audiovisual presentation (AV) • Tutorial computer-based instruction (TCBI) • Stand-up instruction (SU) 	<ul style="list-style-type: none"> • Systems are functionally similar. • Crew understanding required. • Issues need emphasis. • Standard methods of presentation required.
C	Systems Devices	<ul style="list-style-type: none"> • Interactive (full-task) computer-based instruction (ICBI) • Cockpit Procedures Trainers (CPT) • Part task trainers (PTT) • Level 4 or 5 flight training device (FTD 4–5) 	<ul style="list-style-type: none"> • Training can only be accomplished through systems training devices. • Training objectives focus on mastering individual systems, procedures, or tasks versus highly integrated flight operations or “real-time” operations. • Training devices are required to assure attainment or retention of crew skills to accomplish more complex tasks usually related to aircraft systems.
D	Maneuvers Devices	<ul style="list-style-type: none"> • Level 6 or 7 flight training device (FTD 6–7) • Level A or B full flight simulator (FFS A–B) 	<ul style="list-style-type: none"> • Training can only be accomplished in flight maneuver devices in a real-time environment. • Training requires mastery of interrelated skills versus individual skills. • Motion, visual, control loading, and specific environmental conditions may be required.
E	Level C/D FFS or Aircraft	<ul style="list-style-type: none"> • Level C or D full flight simulator (FFS C–D) • Aircraft (ACFT) 	<ul style="list-style-type: none"> • Motion, visual, control loading, audio, and specific environmental conditions are required. • Significant full task differences that require a high fidelity environment. • Usually correlates with significant differences in handling qualities.

Checking Differences Legend

Differences Level	Checking Method Examples	Conditions
A	None	None
B	<ul style="list-style-type: none"> • Oral or written exam • Tutorial computer-based instruction self-test (TCBI) 	<ul style="list-style-type: none"> • Individual systems or related groups of systems.
C	<ul style="list-style-type: none"> • Interactive (full-task) computer-based instruction (ICBI) • Cockpit Procedures Trainers (CPT) • Part task trainers (PTT) • Level 4 or 5 flight training device (FTD 4–5) 	<ul style="list-style-type: none"> • Checking can only be accomplished using systems devices. • Checking objectives focus on mastering individual systems, procedures, or tasks.
D	<ul style="list-style-type: none"> • Level 6 or 7 flight training device (FTD 6–7) • Level A or B full flight simulator (FFS A–B) 	<ul style="list-style-type: none"> • Checking can only be accomplished in flight maneuver devices in a real-time environment. • Checking requires mastery of interrelated skills versus individual skills. • Motion, visual, control loading, and specific environmental conditions may be required.
E	<ul style="list-style-type: none"> • Level C or D full flight simulator (FFS C–D) • Aircraft (ACFT) 	<ul style="list-style-type: none"> • Significant full task differences that require a high fidelity environment.

APPENDIX 2. MASTER DIFFERENCES REQUIREMENTS (MDR) TABLE

These are the minimum levels of training and checking required, derived from the highest level in the Differences Tables in Appendix 3. Differences levels are arranged as training/checking.

Related Aircraft ↓	Base Aircraft →	ERJ 170-100	ERJ 170-200
ERJ 170-100		Not applicable	A/A
ERJ 170-200		A/A	Not applicable
ERJ 190-100		A/A	A/A
ERJ 190-200		A/A	A/A
ERJ 190-ECJ		B/B (1)	B/B (1)
ERJ 190-300		C/B	C/B

NOTE: 1. Level B training and checking is based on only one item: additional memory item for auxiliary fuel system. All other difference items are at Level A/A.

APPENDIX 3. DIFFERENCES TABLES

This Design Differences table includes the ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, and ERJ 190-ECJ. The table was proposed by Embraer S.A. and validated by the Flight Standardization Board (FSB) on 06/27/2017. It lists the minimum differences levels operators must use to conduct differences training and checking (or related aircraft differences training and checking) of flightcrew members.

APPLICABILITY ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	Dimensions	ERJ 170-100: <ul style="list-style-type: none"> • Length: 98 ft, 1 in • Height: 32 ft, 3 in • Wing span: 85 ft, 4 in ERJ 170-200: <ul style="list-style-type: none"> • Length: 103 ft, 11 in • Height: 32 ft, 3 in • Wing span: 85 ft, 4 in ERJ 190-100: <ul style="list-style-type: none"> • Length: 118 ft, 11 in • Height: 34 ft, 8 in • Wing span: 94 ft, 3 in ERJ 190-200: <ul style="list-style-type: none"> • Length: 128 ft, 8 in • Height: 34 ft, 8 in • Wing span: 94 ft, 3 in 	No	No	A	A

APPLICABILITY ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		ERJ 190-100-ECJ: <ul style="list-style-type: none"> • Length: 118 ft, 11 in • Height: 34 ft, 8 in • Wing span: 94 ft, 3 in 				
	Cabin	ERJ 170-100: <ul style="list-style-type: none"> • 78 seats ERJ 170-200: <ul style="list-style-type: none"> • 88 seats ERJ 190-100: <ul style="list-style-type: none"> • 108 seats • Two Type 03 over-wing emergency exits ERJ 190-200: <ul style="list-style-type: none"> • 118 seats • Two Type 03 over-wing emergency exits ERJ 190-100-ECJ: <ul style="list-style-type: none"> • Max passenger capacity according to approved installed executive interior 	No	No	A	A

APPLICABILITY ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	Cargo	<p>ERJ 170-100:</p> <ul style="list-style-type: none"> • 14.33m.cu (total) <p>ERJ 170-200:</p> <ul style="list-style-type: none"> • 17.25m.cu (total) <p>ERJ 190-100:</p> <ul style="list-style-type: none"> • 22.60m.cu (total) <p>ERJ 190-200:</p> <ul style="list-style-type: none"> • 25.40m.cu (total) <p>ERJ 190-100-ECJ: An additional aft baggage cargo compartment Class C at the level of the cabin floor accessible in flight.</p> <p>No passengers or cargo allowed on board unless an approved interior is installed.</p> <p>New CAS Message:</p> <p>ADVISORY:</p> <ul style="list-style-type: none"> • CRG AFT ACCESS OPEN • CRG AFT VENT FAIL 	No	Yes	A	A

APPLICABILITY ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		Cargo compartment procedures, including fire protection, are specified in the applicable Supplemental Type Certificate for the interior.				
	Engines	ERJ 170-100, ERJ 170-200 Takeoff modes: CF34-8E5A1: <ul style="list-style-type: none"> • T/O-1: 13,800 lbf (OEI ATTCS ON: 14,200 lbf) • T/O-2: 13,000 lbf (OEI ATTCS ON: 14,200 lbf) • T/O-3: 11,700 lbf (OEI ATTCS ON: 13,000 lbf) CF34-8E5: <ul style="list-style-type: none"> • T/O-1: 13,000 lbf (OEI ATTCS ON: 14,200 lbf) • T/O-2: 11,700 lbf (OEI ATTCS ON: 13,000 lbf) 	No	No	A	A

	<p>ERJ 190-100, ERJ 190-200</p> <p>Takeoff modes:</p> <p>CF34-10E6A1 (ISA + 20°C):</p> <ul style="list-style-type: none"> • T/O-1: 18,500 lbf • T/O-2: 17,100 lbf (OEI ATTCS ON: 18,500 lbf) • T/O-3: 15,450 lbf (OEI ATTCS ON: 17,100 lbf) <p>CF34-10E5A1 (ISA + 20°C):</p> <ul style="list-style-type: none"> • T/O-1: 18,500 lbf • T/O-2: 17,100 lbf (OEI ATTCS ON: 18,500 lbf) • T/O-3: 15,450 lbf (OEI ATTCS ON: 17,100 lbf) <p>CF34-10E6 (ISA + 20°C):</p> <ul style="list-style-type: none"> • T/O-1: 17,100 lbf (OEI ATTCS ON: 18,500 lbf) • T/O-2: 15,450 lbf (OEI ATTCS ON: 17,100 lbf) <p>CF34-10E6 (ISA + 15°C):</p> <ul style="list-style-type: none"> • T/O-1: 17,100 lbf (OEI ATTCS ON: 18,500 lbf) • T/O-2: 15,450 lbf (OEI ATTCS ON: 17,100 lbf) <p>ERJ 190-100-ECJ</p> <p>Takeoff modes:</p> <p>CF34-10E7-B (ISA + 15°C):</p>				
--	---	--	--	--	--

APPLICABILITY ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<ul style="list-style-type: none"> • T/O-1: 18,500 lbf (OEI ATTCS ON: 20,000 lbf) • T/O-2: 17,100 lbf (OEI ATTCS ON: 18,500 lbf) • T/O-3: 15,450 lbf (OEI ATTCS ON: 16,650 lbf) 				
	Limitations	ERJ 170-100, ERJ170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ Refer to specific AFM for Weights, Center of Gravity, Operational Envelope, and Airspeed differences Envelope extension from -40°C to - 45°C for ERJ 170-100 and ERJ 170- 200	No	No	A	A
	Noise Levels	ERJ 170-100, ERJ170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ Effective Perceived Noise Levels (EPNL) are different.	No	No	A	A

APPLICABILITY ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		Refer to specific model AFM for noise levels measured in EPNdb.				
	EICAS Messages	ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ DOOR EMER LH (RH) OPEN presented only for the ERJ 190-100/190-200. Message associated to proper locking of the over-wing emergency door.	No	No	A	A
	Pressurization	ERJ 190-100-ECJ Maximum cabin altitude is decreased to 6,000 ft at 37,000 ft flight altitude and 7,000 ft at 41,000 ft flight altitude	No	No	A	A
	ATA 23 Communications	CPDLC (option)	No	No	B	B
	ATA 24 Electrical Power	Differences exist for the List of Relevant Inoperative Items ERJ 170-100, ERJ 170-200: <ul style="list-style-type: none"> • DC ESS BUS 2 OFF - Loss of Pitch Trim Indication 	No	Yes	A	A

APPLICABILITY ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<ul style="list-style-type: none"> • DC ESS BUS 3 OFF - Loss of Pitch Trim Indication and Loss of AFT LAV SMOKE DETECTION; ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ: <ul style="list-style-type: none"> • AC BUS 1 OFF - Loss of Pitch Trim Indication • AC ESS BUS OFF - Loss of Pitch Trim Indication • AVNX MAU 2B FAIL - Loss of Mach Trim 				
	ATA 26 Fire Protection	ERJ 170-100, ERJ 170-200: <ul style="list-style-type: none"> • FWD underfloor Cargo (3 detectors) • AFT underfloor Cargo (2 detectors) ERJ 190-100, ERJ 190-200: <ul style="list-style-type: none"> • One additional smoke detector on the FWD and AFT Cargo Area. 	No	Yes	A	A

APPLICABILITY ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		ERJ 190-100-ECJ: No passengers or cargo allowed on board unless an approved interior is installed. Lavatory, cabin, and cargo compartment procedures, including fire protection, are specified in the applicable Supplemental Type Certificate for the interior. New CAS Messages: <ul style="list-style-type: none"> • WARNING – CABIN SMOKE • ADVISORY – CABIN SMOKE DET FAIL, CARGO AFT ACCESS OPEN 				
	ATA 27 Flight Controls	ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ These models have a Mach trim feature which is not presented on the ERJ 170-100 or ERJ 170-200. Flaps 3 is available for takeoff	No	No	A	A

APPLICABILITY ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 28 Fuel	<p>ERJ 170-100, ERJ 170-200:</p> <ul style="list-style-type: none"> • Max usable quantity per tank = 4714 kg • Unusable quantity per tank = 34 kg • Fuel LO LEVEL message trigger = 300 kg <p>ERJ 190-100, ERJ 190-200:</p> <ul style="list-style-type: none"> • Max usable quantity per tank = 6550 kg • Unusable quantity per tank = 46 kg • Fuel LO LEVEL message trigger = 400 kg <p>ERJ 190-100-ECJ (* Level B training and checking required)</p> <p>Equipped with auxiliary fuel system that is comprised of two auxiliary tanks, installed in the pressurized forward and aft cargo compartments of the fuselage.</p> <p>Main System:</p> <ul style="list-style-type: none"> • Max usable quantity per tank = 6485kg 	No	Yes	A/B*	A/B*

APPLICABILITY ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<ul style="list-style-type: none"> • Total= 12970 kg. • Auxiliary System: • Total Fwd Tanks= 4526 kg • Total Aft Tanks= 4374 kg • Total= 8900 kg • Total Fuel System Capacity= 21748 kg • Fuel Low Level message trigger per Wing Tank= 400 kg. <p>New CAS Messages:</p> <p>CAUTION:</p> <ul style="list-style-type: none"> • FUEL FUSELAGE IMBAL • FUEL XFR AUTO FAIL • FUEL FWD OVRD FAIL • FUEL XFR PUMP FAIL • FUEL WING OVERFILL <p>ADVISORY:</p> <ul style="list-style-type: none"> • FUEL XFR FAULT • FUEL XFR VENT FAIL • FUEL XFR SW NOT AUTO • FUEL XFR ISOL FAIL 				

APPLICABILITY ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<p>STATUS (WHITE):</p> <ul style="list-style-type: none"> • FUEL SFR ISOL CLSD <p>Besides the new CAS messages related procedures, the following procedures will include/revise steps related to auxiliary fuel:</p> <ul style="list-style-type: none"> • ENGINE FIRE, SEVERE DAMAGE OR SEPARATION & ENGINE 1(2) FIRE (includes memory item) • FUEL LEAK • FUEL CABIN ODOR (new) • EXTERNAL INSPECTION – NORMAL PROCEDURES 				
	ATA 32 Landing Gear	<p>Landing Gear Warning Inhibition reactivation TLA (Thrust Lever Angle) values changed.</p> <p>ERJ 170-100, ERJ 170-200</p> <p>TL (Thrust Lever) is advanced beyond 45° TLA for two engines.</p>	No	No	A	A

APPLICABILITY ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		TLA is advanced beyond 59° TLA for one engine inoperative. ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ TLA is advanced beyond 38° TLA for two engines. TL is advanced beyond 57° TLA for one engine inoperative.				
	ATA 32 Landing Gear	AUTOBRAKE	No	Yes	B	B
	Tire and Wheel	ERJ 170-100, ERJ170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ Refer to specific AOM for tire pressure values	No	No	A	A
	ATA 33 Lights	ERJ 190-100, ERJ 190-200 Three external emergency lights are installed close to the over-wing emergency exits	No	No	A	A

APPLICABILITY	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
<p>ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ</p>		<p>ERJ 190 100-ECJ</p> <p>Procedures for emergency exit lights and passenger cabin lights are specified in the applicable Supplemental Type Certificate for the interior.</p>				
	<p>ATA 34 Navigation</p>	<p>Flight Management System</p> <p>Primus EPIC Load 27.1</p> <p>RAAS with Landing Alerts and HGS – New symbols for NG FMS.</p> <p>The optional features INAV, Electronic Charts & Maps, 3D Volumetric Weather Radar.</p> <p>Pentium M Compatible Primus Epic Field Loadable Software System (Load 27.2);</p> <p>EJETs Advanced Features Package (INAV/Charts & Maps/ New Classic MFD</p>	<p>No</p>	<p>No</p>	<p>A (for crews previously trained on Load 25.4)</p>	<p>A</p>

APPLICABILITY ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 35 Oxygen	ERJ 190-100-ECJ Passenger Oxygen not installed. No passengers or cargo allowed on board unless an approved interior is installed. Procedures for passenger oxygen are specified in the applicable Supplemental Type Certificate for the interior. New CAS Message: CAUTION: PAX OXY LO PRESS.	No	No	A	A
	ATA 49 Airborne Auxiliary Power	ERJ 190-100-ECJ APU Operating Envelope extended to 37,000 feet	No	Yes	A	A
	ATA 52 Doors	ERJ 190-100, ERJ 190-200 Two over-wing type 03 emergency exits *Refer to §§ 91.1083, 135.331, and 121.417 for the specific overwing emergency exit training requirements.	No	Yes	A*	A

APPLICABILITY ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<p>ERJ 190-100-ECJ</p> <p>The external door MFD synoptic is different since the 190 ECJ is not equipped with service doors nor left overwing emergency exit.</p> <p>1 Fwd LH Pax Door Type I</p> <p>1 RH Overwing Emergency Type III</p> <p>1 Aft LH Baggage Door Type I</p> <p>New CAS Message:</p> <p>ADVISORY: DOORS NOT STOWED</p> <p>No passengers or cargo allowed on board unless an approved interior is installed.</p> <p>Baggage door procedures are specified in the applicable Supplemental Type Certificate for the interior.</p>				

APPLICABILITY ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 71 Powerplant	ERJ 170-100, ERJ 170-200 CF34-8E5A1: <ul style="list-style-type: none"> • N₁ = 99.5% (MAX) • N₂ = 58.5 (MIN) ; 99.4 (MAX) ITT: <ul style="list-style-type: none"> • START = 815°C (MAX) • NORMAL T/O = 989°C (MAX) • NORMAL G/A = 965°C • MAX. T/O and G/A = 1006°C • MAX. CONTINUOUS = 960°C CF34-8E5: <ul style="list-style-type: none"> • N₁ = 99.5% (MAX) • N₂ = 58.5 (MIN) ; 99.4 (MAX) ITT: <ul style="list-style-type: none"> • START = 815°C (MAX) • NORMAL T/O and G/A = 965°C (MAX) 	No	No	A	A

APPLICABILITY ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<ul style="list-style-type: none"> • MAX. T/O and G/A = 1006°C MAX. CONTINUOUS = 960°C <p>ERJ 190-100, ERJ 190-200</p> <p>CF34-10E51 and CF34-10E61:</p> <ul style="list-style-type: none"> • N₁ = 100% (MAX) • N₂ = 59.3 (MIN); 100 (MAX) <p>ITT:</p> <ul style="list-style-type: none"> • START = 740°C (MAX) • NORMAL T/O G/A = 983°C (MAX) • MAX. T/O and G/A = 983 • MAX. CONTINUOUS = 960°C <p>CF34-10E5 and CF34-10E6:</p> <ul style="list-style-type: none"> • N₁ = 100% (MAX) • N₂ = 59.27 (MIN) ; 100 (MAX) 				

APPLICABILITY ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<p>ITT:</p> <ul style="list-style-type: none"> • START = 740°C (MAX) NORMAL T/O G/A = 947°C (MAX) • MAX. T/O and G/A = 983 • MAX. CONTINUOUS = 960°C <p>ERJ 190-100-ECJ</p> <p>CF34-10E7-B:</p> <ul style="list-style-type: none"> • N₁ = 100% (MAX) • N₂ = 59.3 (MIN); 100 (MAX) <p>ITT:</p> <ul style="list-style-type: none"> • START = 740°C (MAX) • NORMAL T/O = 943°C (MAX) • MAX. T/O and G/A = 983 • MAX. CONTINUOUS = 960°C 				

This Maneuver Differences table includes the ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, and ERJ 190-ECJ. The table was proposed by Embraer S.A. and validated by the FSB on 05/04/2018. It lists the minimum differences levels operators must use to conduct differences training and checking (or related aircraft differences training and checking) of flightcrew members.

APPLICABILITY	MANEUVER	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	Preflight Inspection	ERJ 190-100, ERJ 190-200 Addition of overwing exit and emergency lights	No	Yes	A	A
	Normal Takeoff	During Takeoff, in case of flight director is inoperative, the pilot must rotate the airplane according to following: ERJ 170-100, ERJ 170-200 FLAPS POS/TAKE OFF PITCH: <ul style="list-style-type: none"> • 1/11° • 2/10° • 4/12° 	No	Yes	A	A

APPLICABILITY ERJ 170-100, ERJ 170-200, ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ	MANEUVER	REMARKS	FLT CHAR	PROC CHNG	TRAINING	CHECKING
		ERJ 190-100, ERJ 190-200, ERJ 190-100-ECJ FLAPS POS/TAKE OFF PITCH: <ul style="list-style-type: none"> • 1/11° • 2/11° • 3/9° • 4/12° 				
	Non-Normal	Read and do Checklist changes due to annunciation and system changes listed in DESIGN difference tables.	No	Yes	A	A

This Design Differences table from the ERJ 170-100 or ERJ 170-200 to the ERJ 190-300 was proposed by Embraer S.A. and validated by the FSB on 05/01/2018. It lists the minimum differences levels operators must use to conduct related aircraft differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	Flight Deck General Design	Different Amount of Displays Units	No	No	B (SU)	B
	Dimensions	Different Dimensions	No	No	B (SU)	B
	Minimum Turning Radius	Different Minimum Turning Radius	No	No	B (SU)	B
	Limitations Weight	Different Weights	No	No	B (SU)	B
	Limitations Center of Gravity	Different Center of Gravity Envelopes	No	No	B (SU)	B
	Limitations Operational Envelope	Different Operational Envelopes	No	No	B (SU)	B
	Limitations Landing Gear Operation/Extended Speed	Different Landing Gear Operational/Extended speed	No	No	B (SU)	B
	Limitations Cold Soaked Fuel Frost	Different ice or frost accumulation tolerance on the wing	No	No	B (SU)	B
	Limitations Maximum Maneuvering Speed	Different Maneuvering Speed Envelopes	No	No	B (SU)	B

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	Limitations Kinds of Operations (Optional Supplementary Ops Included)	Reduced	No	No	B (SU)	B
	Limitations Fuel	Different Fuel Quantities	No	No	B (SU)	B
	Limitations APU	Different APU Different Operational Limits	No	No	B (SU)	B
	Limitations Engines	Different Engines Different Takeoff Thrust Ratings & Limitations	No	No	B (SU)	B
	Performance	Overall performance is different, including different range/endurance capability, noise levels and takeoff/landing field length requirements	No	No	A	A

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 21 Air Conditioning	GENERAL: <ul style="list-style-type: none"> • Enhanced temperature control system architecture implemented • Cabin automatic temperature control per pax count via MCDU setting 	No	No	A	A
	ATA 22 Autoflight	AUTOPILOT: <ul style="list-style-type: none"> • New triple channel architecture as part of the Full Fly-By-Wire system implemented • Autopilot servos removed (motionless control column/wheel when AP is engaged) • Autopilot coupling/breakout logic implemented 	No	No	B (SU)	B
	ATA 22 Autoflight	GUIDANCE PANEL: <ul style="list-style-type: none"> • Redesigned Pushbuttons and knobs relocated, renamed and/or removed. The major differences are: • YD pushbutton removed • NAV pushbutton renamed LNAV 	No	No	C (FTD)	B

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<ul style="list-style-type: none"> • APP pushbutton renamed APPR • AP pushbutton renamed AUTOPILOT • ALT select knob double-stack design • FPA select knob removed and function attributed to the double-purpose thumbwheel • Pushbuttons and knobs general relocation 				
	ATA 22 Autoflight	YAW DAMPING: <ul style="list-style-type: none"> • Yaw damping automatic operation as part of the Full Fly-By-Wire implemented 	No	No	A	A
	ATA 23 Communications	GENERAL: <ul style="list-style-type: none"> • Iridium sitcom system implemented (OPT)): <ul style="list-style-type: none"> • Audio panel dual HF design implemented 	No	No	A	A

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 23 Communications	CPDLC: <ul style="list-style-type: none"> • CPDLC (OPT) 	No	No	B (CBT)	B
	ATA 24 Electrical Power	AC POWER GENERATION SYSTEM: <ul style="list-style-type: none"> • Increased power generation capacity • DC/AC static inverter removed • AC stand-by bus removed 	No	No	B (SU)	B
	ATA 24 Electrical Power	INDICATIONS Electrical system synoptic: <ul style="list-style-type: none"> • 'AC STBY' bus indication removed • Batteries electrical current information implemented 	No	No	B (SU)	B
	ATA 25 Equipment/Furnishing	GENERAL: <ul style="list-style-type: none"> • Overwing exit escape slide systems implemented. Refer to §§ 91.1083, 135.331, and 121.417 for the specific overwing emergency exit training requirements. 	No	No	B (SU)	B

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<ul style="list-style-type: none"> Cockpit emergency equipment relocated 				
	ATA 25 Equipment/Furnishing	GENERAL: <ul style="list-style-type: none"> Sliding-type, wall rail mounted cockpit observer seat implemented Different cockpit seat adjustments Minimum cabin seating reduced from 98 to 97 passengers 	No	No	A	A
	ATA 26 Fire Protection	SMOKE DETECTION: <ul style="list-style-type: none"> Smoke detection system in the e-bays implemented 	No	No	B (SU)	B
	ATA 26 Fire Protection	SMOKE DETECTION: <ul style="list-style-type: none"> Smoke detectors quantity by cargo compartment modified 	No	No	A	A
	ATA 27 Flight Controls	GENERAL: <ul style="list-style-type: none"> Full Fly-By-Wire closed-loop system architecture implemented (ailerons FBW) Enhanced Normal Mode flight control laws and protection functions implemented (full envelope protection) 	Yes	Yes	B (SU)	B

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<ul style="list-style-type: none"> Enhanced Direct Mode features implemented 				
	ATA 27 Flight Controls	GENERAL: <ul style="list-style-type: none"> Normal or Direct operational modes applicable to all 3 axis simultaneously 	Yes	Yes	B (SU)	B
	ATA 27 Flight Controls	PRIMARY AND SECONDARY FLIGHT CONTROL SURFACES: <ul style="list-style-type: none"> Ailerons FBW-controlled with spoileron logic implemented Multi-Function Spoilers available during Direct Mode operation of the flight controls system Fourth pair of Multi-Function Spoilers (MFS#4) implemented Fifth pair of slats implemented Smaller horizontal stabilizer implemented Single slotted flaps implemented Flap 3 is available for takeoff 	No	No	B (SU)	B

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 27 Flight Controls	HYDRAULIC SYSTEM: <ul style="list-style-type: none"> • Actuators even-odd day (active - std by) design concept replaced by active – active • Multi-Function Spoiler # 4 on hydraulic system 2 implemented 	No	No	B (SU)	B
	ATA 27 Flight Controls	INDICATIONS Flight controls system synoptics: <ul style="list-style-type: none"> • Surface awareness information window implemented • Multi-Function Spoiler # 4 indication implemented 	No	Yes	B (SU)	B
	ATA 27 Flight Controls	<ul style="list-style-type: none"> • Hydraulic system even-odd day indication removed • Ailerons mode/actuators information implemented • One Engine Inoperative sideslip (Best Beta) color-coded target indication implemented on PFD 	No	Yes	B (SU)	B

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 27 Flight Controls	COCKPIT CONTROLS: <ul style="list-style-type: none"> • FLIGHT CONTROLS MODE panel with only one NORMAL MODE pushbutton for the three axis implemented • Rudder pedals artificial feel centering forces feature removed upon trim utilization: • Force-feel feedback alleviation via yaw trim actuation removed as per FFBW (no rudder pedals trim backdrive) • Control wheel artificial feel centering forces feature removed upon trim utilization: • Force-feel feedback alleviation via roll trim actuation removed as per FFBW (no control wheel trim backdrive) 	No	No	B (SU)	B

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 28 Fuel	FUEL TANKS: <ul style="list-style-type: none"> • Center tank (fuel transfer system) implemented • Two AC fuel pumps and one fuel SOV in center tank implemented 	No	Yes	B (SU)	B
	ATA 28 Fuel	FUEL TANKS: <ul style="list-style-type: none"> • Two scavenge pumps removed 	No	Yes	B (SU)	B
	ATA 28 Fuel	CONTROLS: <ul style="list-style-type: none"> • FUEL TRANSFER switch on FUEL control panel implemented • FUEL DC PUMP switch moved from FUEL control panel to APU control panel • Different refueling/defueling control panel 	No	Yes	B (SU)	B

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 28 Fuel	INDICATIONS EICAS: <ul style="list-style-type: none"> • Center tank indication implemented Fuel system synoptics: <ul style="list-style-type: none"> • Center tank indication implemented • Wings magnetic level indicators removed 	No	No	B (SU)	B
	ATA 29 Hydraulic Power	GENERAL: <ul style="list-style-type: none"> • Nose wheel steering and landing gear extension hydraulically segregated • Main landing gear doors actuation by hydraulic system 2 implemented • Multi-Function Spoilers actuation rearranged within hydraulic system 1 & 2 and Multi-Function Spoilers # 4 implemented 	No	Yes	B (SU)	B

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 29 Hydraulic Power	GENERAL: <ul style="list-style-type: none"> • Flight controls actuators even-odd day (active - std-by) design concept replaced by active – active • System 1 (2) AC Motor Pump automatic ON logic during single engine 2 (1) taxi implemented 	No	Yes	B (SU)	B
	ATA 29 Hydraulic Power	INDICATIONS Hydraulic system synoptics: <ul style="list-style-type: none"> • Multi-Function Spoiler rearranged within hydraulic systems 1 & 2 and Multi-Function Spoiler # 4 implemented 	No	No	A	A
	ATA 30 Ice and Rain Protection	CONTROLS: <ul style="list-style-type: none"> • ICE SPEED RESET function in the ICE PROTECTION control panel implemented 	No	Yes	B (SU)	B

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 30 Ice and Rain Protection	INDICATIONS: Anti-ice system synoptics: <ul style="list-style-type: none"> • Additional bleed air pressure indication implemented 	No	No	A	A
	ATA 31 Indicating/Recording Systems	GENERAL: <ul style="list-style-type: none"> • Honeywell Primus Epic Basic FMS NG flight deck (load sw version 27.1) replaced by Honeywell Primus Epic II Basic FMS NG flight deck (load sw version 5.0) 	No	Yes	C (FTD)	B
	ATA 31 Indicating/Recording Systems	DISPLAY UNITS: <ul style="list-style-type: none"> • 5 portrait 80"x10" replaced by 4 landscape 13"x10" • Multi-function windowing capability implemented • Different reversion logic implemented • Displays 1 and 4 (PFDs) available upon power-up/electrical emergency 	No	Yes	C (FTD)	B

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<ul style="list-style-type: none"> • PFDs auxiliary window implemented: • Flight information window implemented 				
	ATA 31 Indicating/Recording Systems	DISPLAY UNITS: <ul style="list-style-type: none"> • MFDs cabin surveillance imagery display implemented (OPT) • ATC uplink window implemented (OPT) 	No	Yes	A	A
	ATA 31 Indicating/Recording Systems	CURSOR CONTROL DEVICES: <ul style="list-style-type: none"> • Display selection buttons double-click (multi-function window toggling) function implemented • CCD #2 'X' cursor symbology implemented • CCD cursor "blooming" indication logic implemented 	No	No	C (FTD)	B
	ATA 31 Indicating/Recording Systems	CURSOR CONTROL DEVICES: <ul style="list-style-type: none"> • Touch pad INAV hotspots implemented (OPT) 	No	No	A	A

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 31 Indicating/Recording Systems	COCKPIT CONTROL PANELS OVERHEAD – DVDR: <ul style="list-style-type: none"> • Honeywell or Universal models not available 	No	Yes	A	A
	ATA 31 Indicating/Recording Systems	OVERHEAD – FUEL: <ul style="list-style-type: none"> • FUEL TRANSFER switch on FUEL control panel implemented • FUEL DC PUMP switch moved from FUEL control panel to APU control panel OVERHEAD – APU: <ul style="list-style-type: none"> • FUEL DC PUMP switch moved from FUEL control panel to APU control panel OVERHEAD – ICE PROTECTION: <ul style="list-style-type: none"> • ICE SPEED RESET function in the ICE PROTECTION control panel implemented 	No	Yes	C (FTD)	B

		<p>GLARESHIELD – LIGHTS:</p> <ul style="list-style-type: none"> • EICAS brightness control knob removed • STB/CLK knob replaced by COMPASS <p>GLARESHIELD – GUIDANCE</p> <p>Redesigned. Pushbuttons and knobs relocated, renamed and/or removed. The major differences are:</p> <ul style="list-style-type: none"> • YD pushbutton removed • NAV pushbutton renamed LNAV • APP pushbutton renamed APPR • AP pushbutton renamed AUTOPILOT • ALT select knob double-stack design • FPA select knob removed and function attributed to the double-purpose thumbwheel • Pushbuttons and knobs general relocation <p>GLARESHIELD – DISPLAY CONTROLLER:</p> <ul style="list-style-type: none"> • BARO SET pre-select function implemented • BARO SET and MINIMUMS knobs swapped position • V/L pushbutton renamed NAV 				
--	--	--	--	--	--	--

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<ul style="list-style-type: none"> • Both display controllers available during electrical emergency implemented <p>MAIN:</p> <ul style="list-style-type: none"> • Clock/chronometer/ET LRU removed. Functions implemented in the PFDs/flight information window • IESI minor relocation • Landing gear lever minor relocation 				
	ATA 31 Indicating/Recording Systems	<ul style="list-style-type: none"> • AUTOBRAKE switch minor relocation • ELT switch minor relocation • EMERG/PRKG BRAKE indicating light minor relocation • GND PROX TERR INHIB pushbutton moved to control pedestal, guard implemented and renamed TERRAIN • GND PROX G/S INHIB pushbutton moved to control pedestal and renamed GLIDE SLOPE 	No	Yes	C (FTD)	B

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<ul style="list-style-type: none"> • LG WRN INHIB pushbutton moved to control pedestal and renamed LG WRN • Revised placards information implemented • Different DISPLAYS knob options on the REVERSIONARY PANEL <p>CONTROL WHEEL:</p> <ul style="list-style-type: none"> • Trim disconnection function of the AP/TRIM DISC pushbutton removed 				
	ATA 31 Indicating/Recording Systems	<ul style="list-style-type: none"> • CABIN SURVEILLANCE SYS control panel implemented (OPT) 	No	Yes	A	A
	ATA 31 Indicating/Recording Systems	<p>CENTER PEDESTAL:</p> <ul style="list-style-type: none"> • FLIGHT CONTROLS MODE panel with only one NORMAL MODE pushbutton for the three axis implemented • IGNITION knobs OVRD position renamed ON 	No	Yes	C (FTD)	B

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<ul style="list-style-type: none"> • Audio panel dual HF design implemented • LG WRN/GROUND PROX INHIBITS panel implemented • GND PROX FLAP OVRD pushbutton moved to LG WRN/GROUND PROX INHIBITS panel and renamed FLAP OVRD 				
	ATA 31 Indicating/Recording Systems	<p>CENTER PEDESTAL:</p> <ul style="list-style-type: none"> • CABIN NON ESSENTIAL panel implemented <p>LATERAL PANELS:</p> <ul style="list-style-type: none"> • EFB docking area and USB ports implemented 	No	Yes	A	A
	ATA 31 Indicating/Recording Systems	<p>CAS MESSAGES:</p> <ul style="list-style-type: none"> • Removal, modification and addition of some CAS messages 	No	Yes	A	A

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 31 Indicating/Recording Systems	AURAL ALERTS: <ul style="list-style-type: none"> • “Low Speed, Low Speed” implemented • “Pitch Angle, Pitch Angle” implemented 	No	No	B (SU)	B
	ATA 31 Indicating/Recording Systems	AURAL ALERTS: <ul style="list-style-type: none"> • “Caution, No RNP” implemented (OPT) • “No RNP, No RNP” implemented (OPT) • “Monitor RADAR Display” implemented (OPT) • “Windshear Ahead, Windshear Ahead” implemented (OPT) • “Go-Around, Windshear Ahead” implemented (OPT) 	No	No	A	A
	ATA 32 Landing Gear	GENERAL: <ul style="list-style-type: none"> • MLG trailing arm design implemented • MLG and NLG height (fuselage ground clearance) increased • MLG full concealment by additional doors implemented 	No	Yes	B (SU)	B

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<ul style="list-style-type: none"> • Alternate LG extension PSEM override switch removed • Nose wheel steering capability after pulling the emergency extension lever implemented • Different Landing Gear Warning Inhibition logic 				
	ATA 32 Landing Gear	AUTOBRAKE: <ul style="list-style-type: none"> • Baseline autobrake implemented • Autobrake training and checking is Level A if previously trained and checked during an E1 training curriculum. 	No	Yes	B (A*)	B (A*)
	ATA 32 Landing Gear	INDICATIONS: <ul style="list-style-type: none"> • Landing gear position indication window framed by flashing amber indication upon aural alert “landing gear” implemented 	No	No	A	A

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 32 Landing Gear	BRAKES MFD status page: <ul style="list-style-type: none"> • Brake temperature numerical values on the MFD status page removed 	No	No	A	A
	ATA 32 Landing Gear	NOSEWHEEL STEERING: <ul style="list-style-type: none"> • Turning radius runway minimum width decreased • Largest radius clearance is required by the wing tip rather than by the h-stab tip 	No	No	A	A
	ATA 32 Landing Gear	TIRE AND WHEEL: <ul style="list-style-type: none"> • Different tire pressure values 	No	No	A	A
	ATA 33 Lights	GLARESHIELD LIGHTS CONTROL PANEL: <ul style="list-style-type: none"> • EICAS brightness control knob removed • STB/CLK knob replaced by COMPASS 	No	No	A	A

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		EMERGENCY LIGHTS <ul style="list-style-type: none"> Emergency lights installed close to the overwing emergency exits 				
	ATA 34 Navigation	GENERAL: <ul style="list-style-type: none"> CDTI (ADS-B in) implemented (OPT) Charts & Maps implemented (OPT) INAV (interactive navigation) implemented (OPT) SmartView (Synthetic Vision System) implemented (OPT) RAAS with Landing Alerts (OPT) 	No	Yes	A	A
	ATA 34 Navigation	FLIGHT PLANING: <ul style="list-style-type: none"> Graphical flight planning implemented (OPT) 	No	No	B (SU)	B

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 34 Navigation	FLIGHT DIRECTOR: <ul style="list-style-type: none"> • LNAV coupling at reduced height (50 ft AGL) implemented • Removal of flight director presentation different logic implemented 	No	Yes	B (SU)	B
	ATA 34 Navigation	WEATHER RADAR: <ul style="list-style-type: none"> • RDR4000 3D volumetric weather radar implemented (OPT): • Predictive windshear + other features 	No	No	A	A
	ATA 34 Navigation	ENHANCED GROUND PROXIMITY WARNING FUNCTION: <ul style="list-style-type: none"> • Permanent peak mode annunciation implemented 	No	No	A	A
	ATA 34 Navigation	E2 Primus Epic Field Loadable Software System (Load 5.7).	No	No	A	A
	ATA 35 Oxygen	GENERAL: <ul style="list-style-type: none"> • Permanent peak mode annunciation implemented 	No	No	A	A

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 36 Pneumatic	GENERAL: <ul style="list-style-type: none"> • Air preparation system implemented 	No	No	A	A
	ATA 38 Water/Waste	CONTROLS: <ul style="list-style-type: none"> • Baseline water drainage capability implemented • Waste tank increased capacity implemented 	No	No	A	A
	ATA 44 Cabin Systems	GENERAL: <ul style="list-style-type: none"> • Different number of passenger seats • Over-wing emergency exits • Enhanced Cabin Management System and Passenger Service Units 	No	No	A	A
	ATA 46 Information Systems	GENERAL: <ul style="list-style-type: none"> • EFB docking area and USB ports implemented 	No	No	A	A
	ATA 47 Inert Gas System	GENERAL: <ul style="list-style-type: none"> • On-board inert gas generation system (OBIGGS) implemented 	No	No	A	A

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 49 Airborne Auxiliary Power	GENERAL: <ul style="list-style-type: none"> • APS2600 APU implemented • Door-equipped, single ram air inlet at 2 o'clock position implemented • Fuel-oil heat exchange implemented • Enhanced operation envelope implemented 	No	Yes	B (SU)	B
	ATA 49 Airborne Auxiliary Power	CONTROLS: <ul style="list-style-type: none"> • APU control panel incorporated the FUEL DC PUMP knob from the FUEL control panel 	No	No	B (SU)	B
	ATA 50 Cargo and Accessory Compartments	GENERAL: <ul style="list-style-type: none"> • Cargo compartment different volume & weight capacity 	No	No	A	A
	ATA 52 Doors	PAX AND SVC: <ul style="list-style-type: none"> • Single handle for vent-flap, locking and latching implemented 	No	Yes	B (SU)	B

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 52 Doors	<ul style="list-style-type: none"> Emergency system handle different design/indication implemented 	No	Yes	B (SU)	B
	ATA 52 Doors	<p>OVERWING EMERGENCY:</p> <ul style="list-style-type: none"> Installation of overwing emergency exits Automatically disposed door implemented <p>* Refer to §§ 91.1083, 135.331, and 121.417 for the specific overwing emergency exit training requirements.</p>	No	Yes	B* (SU)	B
	ATA 52 Doors	<p>COCKPIT:</p> <ul style="list-style-type: none"> Reinforced cockpit door different hinges and latch design implemented 	No	No	A	A
	ATA 53 Fuselage	<p>EXTERNAL INSPECTION ELEMENTS:</p> <ul style="list-style-type: none"> Different location of some features/components as well as implementation/removal of others 	No	No	A	A

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 57 Wings	GENERAL: <ul style="list-style-type: none"> • Gull-type wing with raked wingtips implemented 	No	No	A	A
	ATA 72 Turbine/Turboprop Engine	GENERAL: <ul style="list-style-type: none"> • PW1919G ultra high-bypass ratio, low speed gear-driven fan engines implemented • Takeoff run thrust/elevator compensation schedule implemented • Automatic dry-motoring cycle included during engine normal start (longer engine start cycle) • Different engine start indications (timing & values) 	No	Yes	B (SU)	B
	ATA 72 Turbine/Turboprop Engine	FMS TAKE OFF DATA SETTING AND THRUST RATING SELECTION: <ul style="list-style-type: none"> • TO-3 mode implemented • CLB-1/CLB-2 modes selectable on ground implemented 	No	No	A	A

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 72 Turbine/Turboprop Engine	IGNITION: <ul style="list-style-type: none"> • One dual channel VDC-based (ESS BUSSES) exciter implemented 	No	No	B (SU)	B
	ATA 72 Turbine/Turboprop Engine	CONTROLS: <ul style="list-style-type: none"> • Ignition knob position OVRD renamed to ON 	No	No	A	A
	ATA 72 Turbine/Turboprop Engine	INDICATIONS EICAS: <ul style="list-style-type: none"> • Fan vibration indication implemented • In-flight thrust reverser fail/fault indication implemented • AES (Assisted Engine Start) indication implemented • WML/AES green & white indication logic implemented • Engine EICAS indication decluttering 5 minutes after engines shutdown implemented (FADEC depower function) 	No	Yes	B(SU)	B

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	DESIGN	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 72 Turbine/Turboprop Engine	THRUST REVERSERS: <ul style="list-style-type: none"> • Fixed translating cowl replaced by clocker doors design 	No	No	B (SU)	B

This Maneuver Differences table from the ERJ 170-100 or ERJ 170-200 to the ERJ 190-300 was proposed by Embraer S.A. and validated by the FSB on 05/04/2018. It lists the minimum differences levels operators must use to conduct related aircraft differences training and checking of flightcrew members.

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	MANEUVER	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	Internal Safety Inspection	EMERGENCY EQUIPMENT: <ul style="list-style-type: none"> • Different location FUEL PANEL <ul style="list-style-type: none"> • Fuel transfer knob in AUTO position check implemented APU PANEL: <ul style="list-style-type: none"> • DC pump knob in AUTO position check implemented 	No	Yes	A	A
	Power Up	<ul style="list-style-type: none"> • Only displays 1 and 4 are to be available rather than 2 and 3 • Different battery voltage • 2 minute electrical PBIT rather than 3 minutes • Annunciators testing implemented (moved from BEFORE START) • “AFT EBAY SMOKE”, “CTR EBAY SMOKE” and 	No	Yes	A	A

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	MANEUVER	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<p>“FWD EBAY SMOKE” EICAS messages are also to be displayed when pressing the TEST button on the FIRE EXTINGUISHER panel</p> <ul style="list-style-type: none"> Hydraulic panel as required/FLT CTRL BIT EXPIRED EICAS procedure removed 				
	External Inspection	EXTERNAL INSPECTION ELEMENTS: <ul style="list-style-type: none"> Different location of some features/components as well as implementation/removal of others 	No	Yes	B (SU)	A
	Before Start	COCKPIT LIGHTS PANEL: <ul style="list-style-type: none"> Annunciators test removed (moved to POWER UP) FUEL PANEL: <ul style="list-style-type: none"> FUEL TRANSFER selector knob to AUTO implemented 	No	Yes	A	A

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	MANEUVER	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<ul style="list-style-type: none"> • DC pump check moved to APU panel <p>PASSENGER SIGNS PANEL:</p> <ul style="list-style-type: none"> • NO SMKG switch to ON task removed • NO ELEC DEVICES toggle switch to ON task implemented <p>APU CONTROL PANEL:</p> <ul style="list-style-type: none"> • DC PUMP selector knob to AUTO task implemented <p>AUTOBRAKE PANEL:</p> <ul style="list-style-type: none"> • RTO selection implemented (baseline equipment on E2) <p>CLOCK:</p> <ul style="list-style-type: none"> • Clock set up task removed <p>TRIM:</p> <ul style="list-style-type: none"> • ROLL and YAW operation checks removed <p>ALTERNATE GEAR EXTENSION COMPARTMENT:</p>				

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	MANEUVER	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<ul style="list-style-type: none"> • Override switch check removed 				
	Engine Start	<ul style="list-style-type: none"> • Engine parameters check procedure (selector RUN pos) implemented • Engine oil temperature check implemented 	No	Yes	A	A
	Takeoff	<ul style="list-style-type: none"> • Engines to stabilize at 50% N₁ rather than 40% before advancing to TOGA position • N₁ target check before advancing to TOGA implemented • Different pitch angles in case of flight director is inoperative 	No	Yes	A	A
	Descent	<ul style="list-style-type: none"> • Autobrake selection implemented (baseline equipment on E2) 	No	Yes	A	A
	Shutdown	<ul style="list-style-type: none"> • Increased thermal stabilization time in idle 	No	Yes	A	A

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	MANEUVER	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ECS Off Takeoff	<ul style="list-style-type: none"> • REF A/I OFF or ENG additional condition implemented 	No	Yes	A	A
	Single Engine Taxi	TAXI IN: <ul style="list-style-type: none"> • ACMP operation task removed • Increased thermal stabilization time in idle TAXI OUT: <ul style="list-style-type: none"> • ACMP operation tasks removed • Minimum oil temperature limitation implemented (ENG 1(2) WARM UP status EICAS message) 	No	Yes	A	A
	Icing Conditions, Cold Weather, and Cold Soak Operations	EXTERNAL SAFETY INSPECTION: <ul style="list-style-type: none"> • Flaps inspection holes check implemented • Batts and electronic computer ventilation holes check implemented 	No	Yes	A	A

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	MANEUVER	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
		<p>BEFORE START:</p> <ul style="list-style-type: none"> • ADS probe heaters operation task (as required) removed <p>AFTER START:</p> <ul style="list-style-type: none"> • ADS probe heaters pushed out task removed <p>AIRPLANE ANTI-ICING/ DEICING FLUID APPLICATION WITH ENGINES/APU RUNNING:</p> <ul style="list-style-type: none"> • Pitch trim full nose down to neutral implemented <p>HOLDING:</p> <ul style="list-style-type: none"> • Minimum airspeed 210 KIAS replaced by FOLLOW THE GREEN DOT <p>DESCENT (check removed) THROUGH-FLIGHTS:</p> <ul style="list-style-type: none"> • Flap inspection holes check implemented • Battery and electronic compartment ventilation holes check implemented 				

FROM BASE AIRCRAFT: ERJ 170-100, ERJ 170-200 TO RELATED AIRCRAFT: ERJ 190-300	MANEUVER	REMARKS	FLT CHAR	PROC CHG	TRAINING	CHECKING
	ATA 27 Flight Controls	<ul style="list-style-type: none"> • Pitch trim runaway removed • Roll (yaw) trim runaway removed 	No	Yes	A	A
	All Systems	<ul style="list-style-type: none"> • Some procedures have been either amended, removed or new ones have been implemented 	No	Yes	A	A

APPENDIX 4. EXAMPLE HEAD-UP DISPLAY TRAINING PROGRAM

The Head-Up Display (HUD) pilot training requirements consist of those related to initial and recurrent ground and flight training. Unless covered concurrently during an initial or transition type rating course, a prerequisite to beginning this course of training is prior training, qualification, and currency in the ERJ 170 airplane. It should be noted that the program focuses principally upon training events flown in the left seat by the pilot in command (PIC) in 14 CFR part 121 operations. Nevertheless, second in command (SIC) indoctrination and training is also essential.

1. INITIAL GROUND TRAINING

For air carriers, initial training should be conducted in accordance with the applicable provisions of 14 CFR part 121 §§ 121.415, 121.419, 121.424, and 121.427, the current edition of FAA AC 120-28, Criteria for Approval of Category III Weather Minima for Takeoff, Landing, and Rollout, and the air carrier's operation specifications (OpSpec). For all air carriers, the initial ground training program should include the following elements:

- Classroom instruction covering HUD operational concepts, crew duties and responsibilities, and operational procedures including preflight, normal, and non-normal pilot duties.
- For air carriers wishing credit for low visibility operations predicated on use of the HUD, information should be provided on the operational characteristics, capabilities, and limitations of the ground facilities (surface movement guidance control system) and the airborne Category (CAT) III system. Air carrier policies and procedures concerning low visibility operations should include a reporting process, minimum equipment list (MEL) issues, operation following a missed approach, Operating Experience (OE), and currency requirements.
- Classroom instruction or computer-based training (CBT) on HUD symbology and its interrelationship with airplane aerodynamics, inertial factors, and environmental conditions.
- A HUD pilot training manual or equivalent material in the operations manual which explains all modes of operation, the use of various HUD controls, and clear descriptions of HUD symbology including limit conditions and failures.
- A crew procedures guide clearly delineating pilot flying (PF) and pilot monitoring (PM) duties, responsibilities, and procedural callouts and responses during all phases of flight during which HUD operations are anticipated.
- Emphasis on the availability and limitations of visual cues encountered on approach both before and after decision height (DH). This would include:
 - a) Procedures for unexpected deterioration of conditions to less than minimum Runway Visual Range (RVR) encountered during approach, flare, and rollout.
 - b) Demonstration of expected visual references with weather at minimum conditions.
 - c) Expected sequence of visual cues during an approach in which visibility is at or above landing minima.

- d) A video tape demonstrating all modes of operation complete with sound. For air carriers wishing credit for low visibility operations predicated on use of the HUD, this should include narrative descriptions and several low weather approach demonstrations with procedural callouts and responses. All critical procedural callout possibilities should be covered.
- If the HUD is used to conduct CAT II/CAT III operations, emphasis on the need for rigorous crew discipline, coordination, and adherence to procedural guidelines is required.

2. INITIAL FLIGHT TRAINING

Unless integrated with initial or transition type rating training, flight training dedicated to HUD is in addition to other required elements. For part 121 operators, initial flight training should be conducted in accordance with the applicable provisions of § 121.424. When a full flight simulator (FFS) is used, only FAA-approved ERJ 170 FFS with both a visual display and the HUD installed may be used. For FFS training, all required approaches should be flown from no closer than the final approach fix (FAF) for instrument approaches and from no closer than approximately 1,000 feet above ground level (AGL) (3–4 nautical miles (NM)) to the runway threshold for visual approaches. The following flight training program is generic in nature and should not be construed to dictate what the flight course of instruction must consist of. Each operator has unique requirements, route structure, fleet composition, and operations policies to consider in developing that operator's training program. Therefore, what follows might be considered as a guide to an operator who is tailoring a HUD training program to fit his or her own needs.

In-flight maneuvers should include:

- Straight and level flight, accelerations, and decelerations.
- Normal and steep turns, climbs, and descents.
- Stall prevention and unusual attitude recovery.
- Vectors to intercept and track selected very high frequency omnidirectional range (VOR) courses.

NOTE: Emphasis should be placed on HUD unique symbology (i.e., flight path, flight path acceleration, airspeed error tape, angle of attack limit bracket, and excessive pitch chevrons). When this training is complete, the trainee should have a thorough understanding of the relationship between aircraft flight path parameters and the HUD symbology.

Visual approaches (visual meteorological conditions (VMC) mode) include:

- Perform one approach showing deviations above and below glideslope for symbology/runway relationship.
- Straight-in landings, no wind, repeat with 10-knot crosswind and at night.
- Circling approaches and landing with 10-knot crosswind.

NOTE: It is recommended to fly half of these approaches at different airports that have dissimilar approach and runway lighting systems. Special emphasis should be placed on optimizing circling approach techniques and procedures. Approaches with the aircraft in a non-normal flap configuration should be included.

Instrument approaches:

- a) For all operators:
 - Perform a CAT I approach to 200 foot DH, 2400 RVR, wind calm.
 - Demonstrate failures and incorrect settings on approach (i.e., misset runway elevation, airspeed, selected course).
 - Illustrate unique characteristics of symbology in wind shear conditions (i.e., erratic wind speed and direction, flight path, flight path acceleration and speed error).
 - Perform a nonprecision approach, VOR approach, 600-2 RVR, 15-knot crosswind.

- b) For operators wishing credit for low visibility operations predicated on use of the HUD:
 - Perform a CAT II approach to 100 foot DH, 1200 RVR, 5–10-knot crosswind.
 - Perform a CAT IIIa instrument landing system (ILS) approach and landing starting on a 30° dogleg to final intercept to the ILS, below glideslope, weather clear and calm.
 - CAT IIIa ILS with 700 RVR, wind calm, another ILS with a 10-knot crosswind.
 - CAT IIIa ILS with various reasons for a missed approach (system downgrade, “APCH WARN”, etc.).
 - CAT IIIa ILS with various RVRs and crosswinds, include light turbulence.

NOTE: Several of the instrument approaches should include a variety of ground and airborne system failures requiring pilot recognition and appropriate procedural action. System/component failures could include flap asymmetry problems, engine out operations, Head-Up Guidance System (HGS) sensor failures, etc. Demonstrate how HUD failure modes can reduce precision and increase pilot workload unless PF/PM duties and responsibilities are clearly delineated and understood.

Takeoff:

For operators wishing credit for low visibility takeoff operations predicated on use of the HUD:

- Normal takeoff, clear and calm, repeated with gusty winds.
- Takeoff, 600-foot RVR, 5-knot crosswind.
- Takeoff, 300-foot RVR, 5-knot crosswind, engine failure prior to V₁.
- Takeoff, 300-foot RVR, 5-knot crosswind, engine failure after V₁.
- Takeoff with HGS failure, 300-foot RVR.

For part 121 operators, PICs who have completed HUD training as part of initial, transition, or upgrade training should complete OE for HUD CAT II/IIIa operations within 60 days. SICs

should be authorized to perform Category II/IIIa PM duties upon satisfactory completion of the HUD training.

Check pilots must certify the satisfactory completion of OE for PICs completing initial, transition, and upgrade training. This requirement should include three HUD-assisted takeoffs, one visual approach, and three instrument approaches in conditions not less than RVR 1800.

For all operators, prior to utilizing the HUD in instrument meteorological conditions (IMC) below RVR 1800, each PIC must accomplish at least 25 manually flown HUD approaches to Category II/IIIa minima in VMC. Each approach must terminate in a manually controlled HUD-assisted landing or HUD-assisted go-around. In addition, each PIC must accomplish at least 25 HUD-assisted takeoffs in VMC prior to using the HUD mode in IMC. Upon completion of this requirement, the HUD qualified pilot would then be certificated to conduct HUD approaches to company authorized minima as set forth in their OpSpecs.

3. RECURRENT TRAINING AND CHECKING

Any ERJ 170 flightcrew member who has received HUD training more than 1 year prior to operation of a HUD-equipped ERJ 170 will be required to complete HUD recurrent training. For operators wishing credit for low visibility operations predicated on use of the HUD, during the recurrent training and proficiency checks, the following low visibility operations should be performed in addition to regular requirements:

- Approach and landing, 700-foot RVR, 10-knot crosswind.
- Approach, 700-foot RVR, 10-knot crosswind, light turbulence with missed approach.
- Takeoff, 300-foot RVR, 10-knot crosswind.
- Takeoff, 300-foot RVR, engine failure either before or after V_1 .

Ground training subjects found in this appendix should be reviewed annually.

APPENDIX 5. EMBRAER E1 eQRH

1. PURPOSE AND APPLICABILITY

- 1.1 A Flight Standardization Board (FSB) was convened in May 2017 to determine operational suitability and to evaluate training, checking, and currency requirements for conducting electronic quick reference handbook (eQRH) operations in the Embraer ERJ 170-200 aircraft. Supporting material is available at the Transport Aircraft Seattle Branch. The FSB determination is based on the premise that a flightcrew member is previously trained, qualified, and authorized for Electronic Flight Bag (EFB) cockpit use. This determination may be applied to the ERJ 170-100 and ERJ 170-200 aircraft.
- 1.2 The evaluation was conducted in accordance with FAA Order 8900.1 guidance and the current edition of FAA Advisory Circular (AC) 120-76, Authorization for Use of Electronic Flight Bags. The training and checking operational evaluation was conducted in accordance with AC 120-53.
- 1.3 eQRH Make and Model. The Embraer E1 eQRH is developed for use with commercial-off-the-shelf (COTS) Apple iPad models. These portable electronic device (PED) tablet computers may be classified as either Class 1 “portable” or Class 2 “portable” EFB hardware.
- 1.4 Software Applications. Embraer E-Jets eQRH is classified as a Type B software application and includes the following:
 - Normal procedures.
 - Abnormal procedures.
 - Emergency procedures.
 - Supplemental procedures.
 - Operational documents.
 - Landing performance calculations.
- 1.5 EFB Mounting Device. This report does not include evaluations of any iPad mounting device as would be typical for a Class 2 EFB. If the EFB is to be used as a Class 2 portable device, it is the responsibility of the user/operator to obtain airworthiness installation approval and operational authorization, as well as the means for stowing, locking, and securing the device when not use, including takeoff and landing.
- 1.6 If the portable COTS device is to be used as a Class 1 portable EFB, which typically utilizes a temporary securing solution, it is the responsibility of the user/operator to obtain operational authorization for a means of stowing, locking, and securing the device when not in use, including takeoff and landing.
- 1.7 Display Lighting and Reflectivity. The displays for the Apple iPad models identified in this report have been evaluated in most all applicable lighting conditions. Each model is equipped with appropriate dimming/brightening capability and is readable under a full

range of lighting conditions. The FSB found there is no color wash-out at large viewing angles. The hardware controls of the iPad are not illuminated, but given their very limited number and obvious placement, this is considered acceptable. The legibility under the full range of lighting conditions expected on the operator's flight deck, including use in direct sunlight, remain to be evaluated by each operator.

2. PILOT TRAINING

AC 120-76 should be referenced for general pilot training requirements for operational use of EFBs. For Embraer E-Jets eQRH software use, pilots must complete Level A training as defined in Appendix 1. Specifically, pilots must complete Level A training with the following two operational documents: 1) Embraer eQRH Pilot's Guide; and 2) eQRH Help section, which is embedded in the eQRH software. The FSB has found that only ground training, and no flight training, is sufficient for Embraer E1 eQRH use.

3. PILOT CHECKING

Pilots must demonstrate proficiency with eQRH during initial and recurrent flight checks.

4. PILOT CURRENCY

There are no identified currency requirements for eQRH operations.

5. OPERATIONAL SUITABILITY

5.1 Suitability of eQRH Procedures for all Phases of Flight. Use of the eQRH was evaluated during all phases of flight and was found to be operationally suitable. The EFB must be properly stowed and/or secured for takeoff, final approach, and landing.

5.2 Suitability of Procedures with EFB Failures. Two or more operational EFBs containing Type B software applications for in-flight use are required. For dual failures of applications or tablet computers, alternate procedures or backup systems must be established. It is the responsibility of the user/operator to establish operational procedures for single and dual EFB failures.

6. OPERATIONAL APPROVAL

This report does not approve operational use of the tablet or applications. Aircraft operators must obtain appropriate operational authorizations. Information in this report may be used as a resource for obtaining operational approval.