



**EUROPEAN AVIATION SAFETY AGENCY**



# **Operational Evaluation Board Report**

**Final Report dated: 11 12 2009**

**Manufacturer - Bell Helicopter**

**Bell 206 L,L-1,L-3,L-4 (Long Ranger)**

**European Aviation Safety Agency  
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## Bell 206 L- 4 (*Long Ranger*)



### Revision Record

Revision No.	Section	Pages No.	Date


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# Executive Summary

## 1. Manufacturer Application

Bell Helicopter Manufacturer has made a formal application to EASA, Certification Directorate - Flight Standards to an OEB catch up process for the evaluation of Pilot Initial Type Rating Training syllabus for Bell 206 L, Bell 206 L-1, Bell 206 L- 3 and Bell 206 L- 4 helicopters (Long Ranger variants) and to evaluate the compliance of JAR-OPS 3 -Subparts K & L .

## 2. OEB recommendations

EASA /OEB Section Rotorcraft Manager, and Bell Helicopter Manufacturer experts have participated to evaluate these Pilot Initial Training Syllabi of the Bell 206 L, Bell 206 L- 1 Bell 206 L- 3, Bell 206 L- 4 variants.

The OEB recommends for approval by NAAs

- Initial Pilot Type Rating Training syllabus for Bell 206 L, L-1,L-3, L-4
- Type Rating List and Licence Endorsement List including Bell 206 L, L-1,L-3, L-4
- The standard offered which is in compliance with JAR-OPS 3 Subparts K & L (See Appendix 5).

## 3. Procedures, requirements and associated AMC references

EASA conducted this catch up process in accordance with JAR-OPS 3, JAR-FCL 2 and JAR-FSTD requirements. This evaluation was based on the JOEB Handbook and Common procedures Document (CPD) and the processes detailed in the JAA Administrative and Guidance Material, Section One, Part Two, Chapter 5 and JAR-FCL 2 including associated appendices, AMC and IEM.

This document has been established by analysis of an Initial Pilot Type Rating Training Syllabus.

### Note on references and reference texts:

*Where references are made to requirements and where extracts of reference texts are provided, these are at the amendment state at the date of publication of the report. Readers should take note that it is impractical to update these references to take account of subsequent amendments to the source documents.*



### **Evan Nielsen**

EASA, Certification Directorate  
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## Acronyms

AMC	Acceptable Means of Compliance
AOC	Air Operator Certificate
ASU	Ancillary System Unit
ATPL (H)	Airline Transport Pilot Licence (Helicopter)
ATO	Approved Training Organisation
ATR	Additional Type Rating
BHTCL	Bell Helicopter Textron Canada Limited
BHTA	Bell Helicopter Training Academy
CPL	Commercial Pilot Licence
CWP	Caution and Warning Panel
DC	Direct Current (electrical)
DECU	Digital Engine Control Unit
DGAC	Direction Générale de l'Aviation Civile (French Civil Aviation Authority)
EASA	European Aviation Safety Agency
EMB	Electrical Master Box
FADEC	Full Authority digital Engine Control
FLI	First Limit Indication
FTD	Flight Training Device
FNPT	Flight and Navigation and Procedure Trainer
FSTD	Flight Simulation Training Device
FTO	Flight Training Organisation
IEM	Interpretative and Explanatory Material
IFR	Instrument Flight Rules
IR	Instrument Rating
ITR	Initial Type Rating
JAA	Joint Aviation Authorities
JAR-FCL 2	Joint Aviation Requirements Flight Crew Licensing (Helicopters)
JAR-OPS 3	Joint Aviation Requirements Operations 3 (Commercial Transport Helicopters)
JOEB	Joint Operational Evaluation Board
MDR	Master Difference Requirements
MEL	Minimum Equipment List
MGB	Main Gear Box
MMEL	Master Minimum Equipment List
NCAA	National Civil Aviation Authority
N/A	Not Applicable
ODR	Operator Differences Requirements
OEB	Operational Evaluation Board
PPL (H)	Private Pilot Licence (Helicopter)
RFM	Rotorcraft Flight Manual
SCU	System Control Unit
SET (H)	Single Engine Turbine (Helicopter)
TGB	Tail Gear Box
TRI	Type Rating Instructor
T/R	Tail Rotor
TRTC	Type Rating Training Course
TRTO	Type Rating Training Organisation
VFR	Visual Flight Rules

## I. Purpose and applicability

Data is being submitted by Bell Helicopter in support of the catch up OEB process for the Bell 206 L, Bell 206 L-1, Bell 206 L- 3 and Bell 206 L- 4 models. Data concerning differences between the 206 L, 206L-1, 206L-3 and 206L-4 is included to support the differences training between these variants. For the purposes of this evaluation Bell considers the 206L-3 and the 206L-4 to be essentially the same model. Therefore, the operator difference tables (ODR) (See Appendix 3) include a comparison of the 206L to the 206L-1 and the 206L-1 to the 206L-4.

This report is the result of a catch up process evaluation which has been made by analysis and comparison, based on the Pilot Initial Type Rating Training syllabus provided by the Bell Helicopter Training Academy authorized by FAA for the Bell 206 helicopter (See Appendix 6) and also on the Initial Pilot Type Rating Training syllabus for the Bell 206 helicopter already approved by other NAA.

The evaluation of the Bell 206 L, Bell 206 L-1, Bell 206 L- 3 and Bell 206 L- 4 helicopter has also shown that the standard offered is in compliance with JAR-OPS 3 Subparts K & L (See Appendix 5).

This document:

- Provides a general description of Bell 206 Long Ranger helicopter variants including Bell 206 L, Bell 206 L- 1 Bell 206 L- 3, Bell 206 L- 4
- Updates both Type Rating List and Licence Endorsement List including Bell 206 Long Ranger Helicopter variants
- Makes recommendations for Bell 206 Long Ranger Helicopter variants Pilot initial type rating training syllabus (ITR)

Note:

*Bell 206 helicopter family is listed in the Type Certificate Data Sheet delivered by The Department of Transportation / Federal Aviation Administration under TCDS- NO.H2SW - (See Appendix 1), and in the Type Certificate Data Sheet delivered by Transport Canada under TCDS- H-92 (See Appendix 7),.*



## 2. General Description of Bell 206 (Long Ranger)

### General

The 206 Long Ranger is a single engine Turbine seven place helicopter designed to takeoff and land on any reasonably level terrain. Standard configuration provides for one pilot and six passengers. It is approved for VFR day and night operation and has been certificated for a minimum crew of one pilot in the starboard seat.

### Structure

The fuselage consists of three main sections: the Forward Section which extends from the cabin nose to the bulkhead aft of the passenger compartment, the Intermediate Section which extends from the bulkhead aft of the passenger compartment to the tailboom, and the Tailboom Section. The forward section utilizes aluminum honeycomb structure and provides the major load carrying elements of the forward cabin. It provides for pilot and passenger seating, fuel cell enclosure, and pylon support. The intermediate section utilizes an aluminum semi-monocoque construction and provides a deck for engine installation, a baggage compartment, and a compartment under the engine deck for heater and electrical equipment. The tailboom consists of an aluminum alloy monocoque tailboom which supports the tail rotor drivetrain as well as a horizontal stabilizer with end plates, vertical fin, and fairings.

### Landing Gear

The helicopter can be equipped with various landing gear configurations including: low skid landing gear (standard), high skid landing gear, float landing gear, or emergency flotation gear.

### Main Rotor

The main rotor is a semi-rigid, seesaw, two blade design that employs a preconed and underslung feathering axis to ensure smooth operation.

### Tail Rotor

The tail rotor is a semi-rigid, delta hinged, two blade design.

### Drive System

The drive train system provides a means of transmitting power from the engine to the main and tail rotor assemblies

### Flight controls

The flight controls are mechanical linkages that are actuated by conventional controls and are used to control flight attitude and direction. Both the cyclic and the collective controls incorporate hydraulic servo actuators. The main rotor controls consist of the swashplate, drive link and pitch links.

### Engine

The 206 L helicopter is powered by the Allison Rolls-Royce, Model 250-C20B and the 206L-1 is powered by the Allison Rolls-Royce, Model 250-C28B engine Turbine. The 206 L-3 and L-4 helicopter are powered by a Rolls-Royce Model 250-C30P . There is no FADEC on these models.

**Hydraulic system**

The hydraulic system provides pressurized fluid to operate the cyclic and collective flight control servo actuators. Operation of the system is electrically controlled by means of the hydraulic system switch.

**Fuel system**

The fuel system comprises three interconnected crash-resistant fuel cells. The two forward cells are located under the mid passenger seats and the aft fuel cell is located below and behind the aft passenger seat. The helicopters are designed to operate on standard aviation jet fuels.

**Electrical system**

The helicopter is equipped with a 28 VDC electrical system. The helicopter electrical power is provided by a nickel-cadmium battery, a starter-generator and an external power receptacle.

### 3. Helicopters main characteristics:

**Bell 206L**

The 206L has the following characteristics:

- Powered by a Rolls-Royce Allison 250-C20B or C20J engine
- Useable fuel capacity of 98. US gallons
- MTOW with internal load of 4000 lb
- MTOW with external load of 4000 lb

**Bell 206L1**

The 206L1 has the following characteristics:

- Powered by a Rolls-Royce Allison 250-C28B engine
- Useable fuel capacity of 98.4 US gallons
- MTOW with internal load of 4050 lb
- MTOW with external load of 4250 lb

**Bell 206L3**

The 206L3 has the following characteristics:

- Powered by a Rolls-Royce Allison 250-C30P
- Useable fuel capacity of 110.7 US gallons
- MTOW with internal load of 4150 lb
- MTOW with external load of 4250 lb
- 

**Bell 206L4**

The 206L4 has the following characteristics:

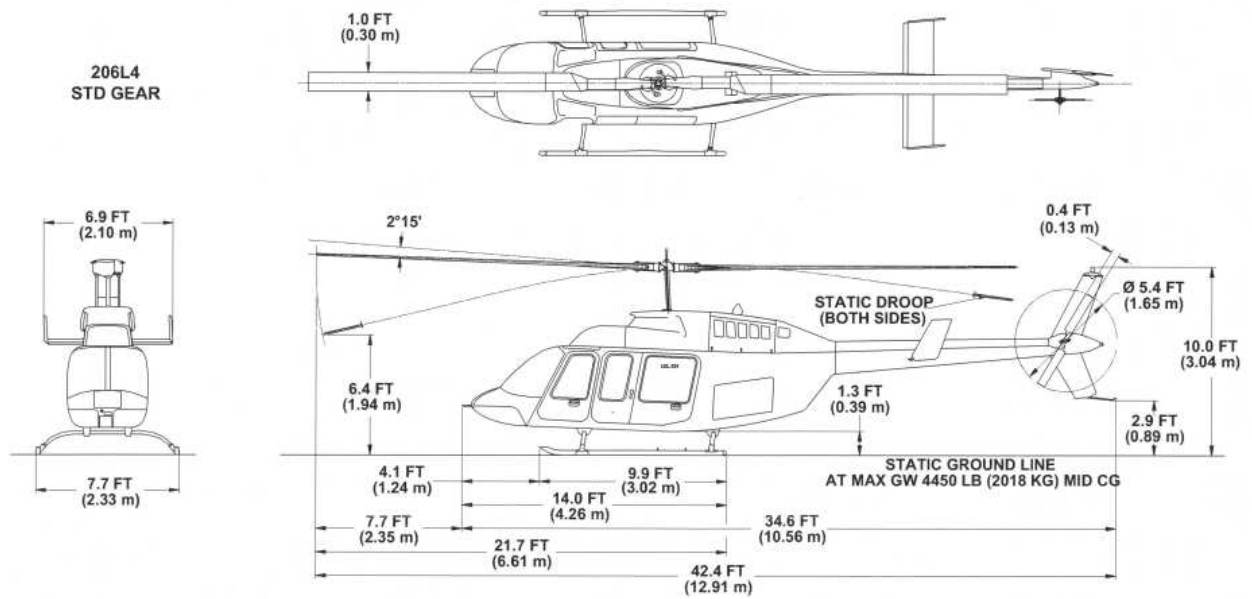
- Powered by a Rolls-Royce Allison 250-C30P
- Useable fuel capacity of 110.7 US gallons
- MTOW with internal load of 4450 lb
- MTOW with external load of 4550 lb

			206L	206L-1	206L-3	206L-4
Dimensions	Fuselage	Length	10.13m	10.13m	10.13m	10.13m
		Width	1.32m	1.32m	1.32m	1.32m
		Height	3.11m	3.11m	3.11m	3.11m
	Main Rotor	Diameter	11.28m	11.28m	11.28m	11.28m
	Tail Rotor		1.65m	1.65m	1.65m	1.65m
Number of Main Rotor Blades			2	2	2	2
Engines			Rolls-Royce Allison 250-C20B/J	Rolls-Royce Allison 250-C28B	Rolls-Royce Allison 250-C30P	Rolls-Royce Allison 250-C30P
Engine Control System			Hydro-mechanical	Hydro-mechanical	Hydro-mechanical	Hydro-mechanical
Fuel Cells	Number of Cells		3	3	3	3
	Usable Capacity		98 U.S. gallons	98.4 U.S. gallons	110.7 U.S. gallons	110.7 U.S. gallons
Air Speed	Power ON <sup>(1)</sup>	Absolute $V_{NE}$	130 kt	130 kt	130 kt	130 kt
	Power OFF <sup>(2)</sup>		100 kt	100 kt	100 kt	100 kt
	Doors Off <sup>(2)</sup>		87 kt	90 kt	90 kt	90 kt
Rotor Speed	Power ON		97 – 100%	97 – 100%	97 – 100%	99 – 101%
	Power OFF		97 – 100%	90 – 107%	90 – 107%	90 – 107%
Max Operating Pressure Altitude			20,000 ft	20,000 ft	20,000 ft	20,000 ft <sup>(3)</sup>
MTOW with Internal Load			4000 lbs (1814 kg)	4050 lbs (1837 kg)	4150 lbs (1882 kg)	4450 lbs (2019 kg)
MTOW with External Load			4000 lbs (1814 kg)	4250 lbs (1928 kg)	4250 lbs (1928 kg)	4550 lbs (2064 kg)

- (1)  $V_{NE}$  for altitudes from Sea Level to 3000 ft. Decrease  $V_{NE}$  for ambient conditions in accordance with flight manual.
- (2) Stated  $V_{NE}$  applies unless placarded  $V_{NE}$  is less.
- (3) 206L-4: Maximum Density Altitude ( $H_D$ ) is 10,000 feet when gross weight is above 4150 pounds.

## Exterior Dimensions

### Bell 206L Standard Low Skid Gear



## 4. Operator Difference Requirement (ODR) Tables

Operator Difference Requirement tables have been produced by BHTCL to support to the OEB Catch up for Bell 206 L, Bell 206 L- 1 and Bell 206 L-3 / Bell 206 L-4 based on Pilot Initial Type Rating Training syllabus (See Appendix 3).

## 5. Optional specific equipment

Bell 206 optional equipments are provided by Bell Helicopter Manufacturer and Listed in detail in appendix. Any optional equipment requires additional training (See Appendix 4).

## 6. Master Differences Requirements:

### 6.1 Difference Level Summary.

Difference levels are summarised in the table below for training, checking, and currency. This table is an extract only and complete descriptions of difference levels for training, checking and currency are given in OPS/FCL Common Procedures for conducting Operational Evaluation Boards document.

#### DIFFERENCE LEVEL TABLE

<u>DIFFERENCE LEVEL</u>	<u>TRAINING</u>	<u>CHECKING</u>	<u>CURRENCY/ RECURRENT TRAINING</u>
A	SELF INSTRUCTION	NOT APPLICABLE (OR INTEGRATED WITH NEXT PC)	NOT APPLICABLE
B	AIDED INSTRUCTION	TASK OR SYSTEM CHECK	SELF REVIEW
C	SYSTEMS DEVICES	PARTIAL CHECK USING DEVICE	DESIGNATED SYSTEM
D	MANOEUVRE DEVICES**	PARTIAL PC USING DEVICE *	DESIGNATED MANOEUVRE(S)
E	SIMULATOR C/D OR AIRCRAFT #	FULL PC USING SIMULATOR C/D OR AIRCRAFT *	AS PER REGULATIONS (TAKEOFFS & LANDINGS IN SIMULATOR C/D OR THE AIRCRAFT)

\* = IOE/SLF/LIFUS/line MAY BE REQUIRED ACCORDING TO REGULATIONS

PC = PROFICIENCY CHECK

\*\*FFS or aircraft may be used to accomplish specific manoeuvres

### 6.2. Training, Checking, and Recurrent Training difference requirements

The Master Differences Requirements are from levels A to A .Master Difference Requirement tables have been produced by BHTCL and analysed by the OEB during this Catch up.

	From Helicopter				
		206L	206L- 1	206L- 3	206L- 4
To Helicopter	206L		A/A/A	A/A/A	A/A/A
	206L- 1	A/A/A		A/A/A	A/A/A
	206L- 3	A/A/A	A/A/A		A/A/A
	206L- 4	A/A/A	A/A/A	A/A/A	

## 7. Type Rating List and Licence Endorsement List

### 7.1 Type Rating List

The proposal of this OEB is to update the Type Rating List (Helicopters) as follows:

- Table 9 / Type Rating List (Helicopters)

1 Manufacturer	2 Helicopter	3	4 Licence endorsement
<b>Bell Helicopters</b>			
-SE Turbine -	Bell 206 L Bell 206 L- 1 Bell 206 L- 3 Bell 206 L- 4		Bell 206
	Bell 407		Bell 407

This table 9 matrix contains only Helicopters that have been evaluated through a JOEB, an OEB or a Catch-Up process. Associated reports are published on the EASA -Flight Standards Website and Pilot Training courses are available from the Manufacturers

### 7.2 Licence Endorsement List

The proposal of this OEB is to update the Licence Endorsement List – Type Rating List (Helicopters) as follows:

- Table 18 / Licence Endorsement List – Type Ratings (Helicopters)

1 Manufacturer	2 Helicopter	3	4 Licence endorsement
<b>Bell Helicopters</b>			
- SE Turbine -	Bell 206 A Bell 206 B Bell 206 B 2 Bell 206 B 3	(D)	Bell 206
	Bell 206 L Bell 206 L- 1 Bell 206 L- 3 Bell 206 L- 4		
	Bell 407		Bell 407

## 8. Specification for Training

### 8.1 Training Courses

The assessment is based on the Pilot Initial Type Rating Training syllabus proposed by Bell Helicopter Training Academy as authorised by FAA and in addition on other training syllabi proposed by European FTOs' already approved by NAA.

The OEB recommends the Initial pilot training syllabus be divided into the following phases for approval in Approved Training Organisations, like FTO and TRTO and also for operator specific training, provided the operator specific documentation is used throughout the course:

- Theoretical knowledge syllabus and test summary
- Helicopter flight training Course summary
- Skill test(s)

### 8.2 Licensing requirements

Appendix 1 to JAR FCL 2.261(b) and NPA No 2008-17B - AMC No 2 to FCL.725 (a) require for:

- an initial type rating on a SET (H) under 3175Kg (7000 Lbs) MTOW, an approved flight instruction of 5 flight hours in the helicopter. (excluding skill test) ( See Appendix 2).

Note:

*These requirements have to be considered as the bare minimum; additional training could be necessary depending on:*

- *complexity of the helicopter type, handling characteristics, level of technology*
- *previous experience of the applicant.*

### 8.3 Type rating training minimum syllabus summary

- **ITR** : Initial Single-Engine Turbine helicopter VFR Type Rating,

QUALIFICATION HOLD	ITR
<i>Single Engine Piston</i> ----- >>>	√
<i>Single Engine Turbine</i> ----- >>>	
<i>Multi Engine Turbine</i> ----- >>>	√
<b>Total of theoretical knowledge syllabus + Test</b>	<b>20h00</b>
<b>Cockpit or Computer Trainer Self Instruction</b>	/
<b>Total Flight Training</b>	<b>5h00</b>

### 8.4 Theoretical knowledge syllabus and test summary

Type Rating theoretical knowledge syllabus	Bell 206 Long Ranger
Helicopter structure, transmissions, rotors and equipment, normal and abnormal operation of the systems (*): <ul style="list-style-type: none"> <li>• Enrolment General Description</li> <li>• Airframe</li> <li>• Crew Compartment</li> <li>• Electrical</li> <li>• Fuel System</li> <li>• Power plant</li> <li>• Drive train &amp; Rotors</li> <li>• Flight Controls &amp; Hydraulics</li> </ul>	14h30
<ul style="list-style-type: none"> <li>• Weight and Balance /</li> <li>• Performance, flight planning and monitoring</li> <li>• Emergency procedures</li> <li>• Limitations</li> <li>• Pre-flight</li> </ul>	04h30
Optional equipment	<b>In addition</b>
<b>Total Theoretical Knowledge Syllabus</b>	<b>18h30</b>
<b>Final Theoretical Exam</b>	1h30
<b>Total</b>	<b>20h00</b>



On completion of the theoretical phase, the trainee is assessed via a multiple-choice questionnaire covering the entire program. To obtain the type rating, the threshold for passing is 75% of correct answers in the written examination on a range of multiple-choice or computerized questions and on completion of flight training, passing the practical skill test as defined in Appendix 3 to JAR-FCL 2.240.

### 8.5 Helicopter flight training Course summary

Helicopter Flight Training course	Bell 407
1. Pre-flight, cockpit, engine start, Basic air work, Flight Maneuvers, General Handling	1h15
2. Quick stop, autorotations,Hydraulic OFF procedures, Forced landings, Tail rotor failures	1h15
3. Review of all flight manoeuvres, Autorotations, Tail rotor failures	1h15
4. Review of all flight manoeuvres, Autorotations, Tail rotor failures, Slope landings, Confined area landings, Pinnacle approaches /landings	1h15
<b>Total Flight Training</b>	<b>5h00</b>
<b>SKILL TEST</b> In accordance with appendix 3 of FCL 2.240 On completion of single pilot VFR type rating training	<b>Required</b>

Notes:

*During the flight “1”, the Type Rating Instructor will evaluate the trainee level.*

*The flight training course corresponds to the basic aircraft certification and satisfies the conditions of JAR-FCL 2.220, taking into account the type of license held and the experience of the candidate.*

*Each flight session could be extended or reduced by 15 minutes at the discretion of the instructor; but the total time will remain 5h00 minimum.*

*Additional flight could be necessary at the discretion of the instructor if the trainee has not successfully demonstrated the ability to perform all manoeuvres with a high degree of proficiency.*

*Depending on the configuration of the aircraft used and on customer's request, additional flights may also be performed to enhance basic initial type rating training (minimum syllabus).*

## 8.6 Familiarisation training

Helicopter Models	Content of theoretical subjects	Duration	Reference
Bell 206 L Bell 206 L- 1 Bell 206 L- 3 Bell 206 L- 4	Significant differences in the following parts : <ul style="list-style-type: none"> <li>• Presentation of the aircraft, structure, transmission, rotors and equipment, normal and contingency operation of the systems</li> <li>• Limitations</li> <li>• Performance, preparation and flight control</li> <li>• Weight and balance, operation</li> <li>• Optional equipment</li> </ul>	<b>4h00</b>	RFM and Pilot Operating Handbook

Note:

*Additional familiarisation training may depend on optional equipment installed on specific variants, and must be completed in accordance with the appropriate level of training.*

## 8.7 Skill test

As required by JAR-FCL 2.240, JAR-FCL 2.262 and Appendix 3 to JAR FCL 2.240

## 9. Specification for Checking

As required by JAR-FCL 2.245 and Appendix 3 to JAR FCL 2.240

## 10. Specification for Flight Simulation Training Devices

When this report was finalised no Flight Simulator and no Flight Training Device qualified in accordance with JAR-FSTD (H) and compliant with EASA requirements were available.

Note

*Available FTD not qualified in accordance with JAR-FSTD (H) can be utilized to supplement the flight training but FTD in this case will not replace actual aircraft time.*

*For a 206 Long Ranger course, 1 hour supplemental training in such FTD to cover manoeuvre's not performed in the helicopter is acceptable.*

## 11. Application of JOEB report

This OEB report applies to commercial operations. However, the OEB also recommends private or corporate operations to follow the findings of this report.

## 12. Appendices

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