



**EUROPEAN AVIATION SAFETY AGENCY**  
**EXPERT DEPARTMENT / CERTIFICATION DIRECTORATE**



# **Operational Evaluation Board Report**

**Final Report**  
**Revision 1: 19 06 2012**

**Manufacturer: Bell Helicopter**

**Bell 407 & Bell 407GX**

**European Aviation Safety Agency**  
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## Bell 407



## Bell 407GX



## Revision Record

Revision No.	Section	Pages No.	Date
Original	All	All	11/12/2009
Revision 1	Including Integrated Avionics System / 407GX	All	15/06/2012

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## Operational Evaluation Board – OPS / FCL Subgroup

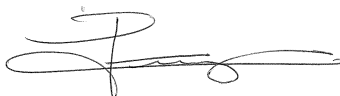
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**Bell Helicopter Experts involved in the process**

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## Executive Summary

### 1. Manufacturer Application

Bell Helicopter Manufacturer initially has made a formal application to EASA - Certification Directorate to an OEB catch up process for the evaluation of the Bell 407 helicopter Initial Pilot Type Rating Training syllabus and to evaluate the compliance of JAR-OPS 3 -Subparts K & L. The original OEB report has been published December 2009.

The manufacturer in December 2011 has requested EASA to evaluate the Bell 407GX in order to consider this helicopter as a variant of the Bell 407 and to cover :

- Initial Pilot Type Rating Training syllabus,
- Difference training course
- Compliance Check List to JAR-OPS 3 -Subparts K & L,
- Master Minimum Equipment List.

### 2. OEB recommendations

The OEB recommends the following for approval by NAAs regarding the Bell 407 & Bell 407GX:

- Initial Pilot Type Rating Training syllabus
- Difference training course
- Type Rating List / Licence Endorsement
- The standard offered which is in compliance with JAR-OPS 3 Subparts K & L.

### 3. Procedures, requirements and associated AMC references

EASA representatives have conducted this OEB in accordance with JAR-OPS 3, Part-FCL and JAR-FSTD H 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 Part-FCL including associated appendices, AMC and GM.

#### 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.

#### **François FABRE**

EASA – Deputy Head of Expert Department  
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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

Bell helicopter considers the model 407 helicopter to be sufficiently different from the Bell 206L models that it is not a candidate for differences training using familiarity with any 206 model as a basis. As a result Bell recommends that a full 407 training course be required for 407 flight crew licensing.

The original report is the result of a catch up process evaluation which has been made by analysis and comparison, based on the Pilot Initial Training syllabus of Bell Helicopter Training Academy authorized by the FAA for the Bell 407 helicopter (See Appendix 3), and also on the Type Rating Training syllabus for the Bell 407 helicopter already approved by a European NAA.

The evaluation of the Bell 407 has also shown that the standard offered is in compliance with JAR-OPS 3 Subparts K & L.

**This revision 1 report includes the evaluation the Bell 407GX equipped with the Integrated Avionics System (Garmin 1000H) in order to consider this helicopter as a variant of the Bell 407.**

The Bell 407GX has also shown the compliance with JAR-OPS 3 Subparts K & L (See Appendix 4).

This document:

- Provides a general description of the Bell 407 & 407GX helicopters
- Updates the Type Rating List and Licence Endorsement List to include Bell 407 & 407GX
- Makes recommendations for the Bell 407 & 407GX
  - Pilot initial type rating training syllabus (ITR)
  - Difference Training between the Bell 407 & the Bell 407GX

Notes:

*The Bell 407 S/N 54300 and subsequent have the commercial designation of 407GX, and are equipped with Integrated Avionics System (Garmin 1000H)*

*Bell 407 & Bell 407GX helicopter are listed in the EASA Type-Certificate Data Sheet N°IM.R.512, (See Appendix 1)*



## 2. General Description of Bell 407 & 407GX

### General

The Model 407 is a single engine Turbine, seven-place light helicopter. Standard configuration provides for one pilot and six passengers.

### Structure

The fuselage consists of three main sections: the Forward Section, the Intermediate Section, and the Tailboom Section. The forward section utilizes aluminum honeycomb and carbon graphite structure and provides the major load carrying elements of the forward cabin. The intermediate section is a semi-monocoque structure which uses bulkheads, longerons and carbon fiber composite side skins. 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

Basic helicopter landing gear is the low skid type. Optional pop-out emergency flotation gear or high skid gear is also available.

### Main Rotor

The main rotor is a four-bladed, soft-in-plane design with a composite hub and individually interchangeable blades.

### Tail Rotor

The tail rotor is a two-bladed teetering rotor that provides directional control.

### Drive System

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

### Flight controls

Main rotor and tail rotor flight control systems, consisting of cyclic, collective and anti-torque controls are used to regulate the helicopter attitude, altitude and direction of flight. The flight controls are hydraulically boosted to reduce pilot effort and to counteract control feedback forces.

### Engine

The helicopter is powered by a Rolls-Royce, Model 250-C47B engine Turbine. The engine incorporates a Full Authority Digital Engine Control (FADEC) system.

### Fuel system

The fuel system consists of two crash resistant, bladder type fuel cells. The forward fuel cell is located underneath and between the aft facing passenger seats. The aft fuel cell is located underneath and behind the aft passenger seats. The helicopters are designed to operate on standard aviation jet fuels.

**Electrical system**

The helicopter is equipped with a 28 VDC electrical system. Power for this system is obtained from a nickel-cadmium 24 volt, 17 amp/hour battery or optional 24 volt/28 amp-hour battery and a 30 volt/200 amp starter-generator. External power may be supplied to the helicopter by means of a receptacle located on the lower front section of helicopter.

**Instrument panels**

*Bell 407 / Analogic Avionics*



*Bell 407GX / Integrated Avionics System (Garmin 1000H)*



### 3. Helicopter main characteristics:

#### 3.1 Sum up of main characteristics and comparison of the Bell 206 Long Ranger and the Bell 407 & 407GX

			Bell 206L	Bell 206L-1	Bell 206L-3	Bell 206L-4	Bell 407 & 407GX
Dimensions	Fuselage	Length	10.13m	10.13m	10.13m	10.13m	10.17m
		Width	1.32m	1.32m	1.32m	1.32m	1.50m
		Height	3.11m	3.11m	3.11m	3.11m	2.68m
	Main Rotor	Diameter	11.28m	11.28m	11.28m	11.28m	10.67m
	Tail Rotor		1.65m	1.65m	1.65m	1.65m	1.65m
Number of Main Rotor Blades			2	2	2	2	4
Engines			Rolls-Royce Allison 250-C20B/J	Rolls-Royce Allison 250-C28B	Rolls-Royce Allison 250-C30P	Rolls-Royce Allison 250-C30P	Rolls-Royce Allison 250-C47B
Engine Control System			Hydro-mechanical	Hydro-mechanical	Hydro-mechanical	Hydro-mechanical	FADEC
Fuel Cells	Number of Cells		3	3	3	3	2
	Usable Capacity		98 U.S. gallons	98.4 U.S. gallons	110.7 U.S. gallons	110.7 U.S. gallons	127.8 U.S. gallons
Air Speed	Power ON <sup>(1)</sup>	Absolute V <sub>NE</sub>	130 kt	130 kt	130 kt	130 kt	140 kt
	Power OFF <sup>(2)</sup>		100 kt	100 kt	100 kt	100 kt	100 kt
	Doors Off <sup>(2)</sup>		87 kt	90 kt	90 kt	90 kt	100 kt
Rotor Speed	Power ON		97 – 100%	97 – 100%	97 – 100%	99 – 101%	99 – 100%
	Power OFF		97 – 100%	90 – 107%	90 – 107%	90 – 107%	85 – 107%
Max Operating Pressure Altitude			20,000 ft	20,000 ft	20,000 ft	20,000 ft <sup>(3)</sup>	20,000 ft
MTOW with Internal Load			4000 lbs (1814 kg)	4050 lbs (1837 kg)	4150 lbs (1882 kg)	4450 lbs (2019 kg)	5000 lbs (2268 kg)
MTOW with External Load			4000 lbs (1814 kg)	4250 lbs (1928 kg)	4250 lbs (1928 kg)	4550 lbs (2064 kg)	6000 lbs (2722 kg)

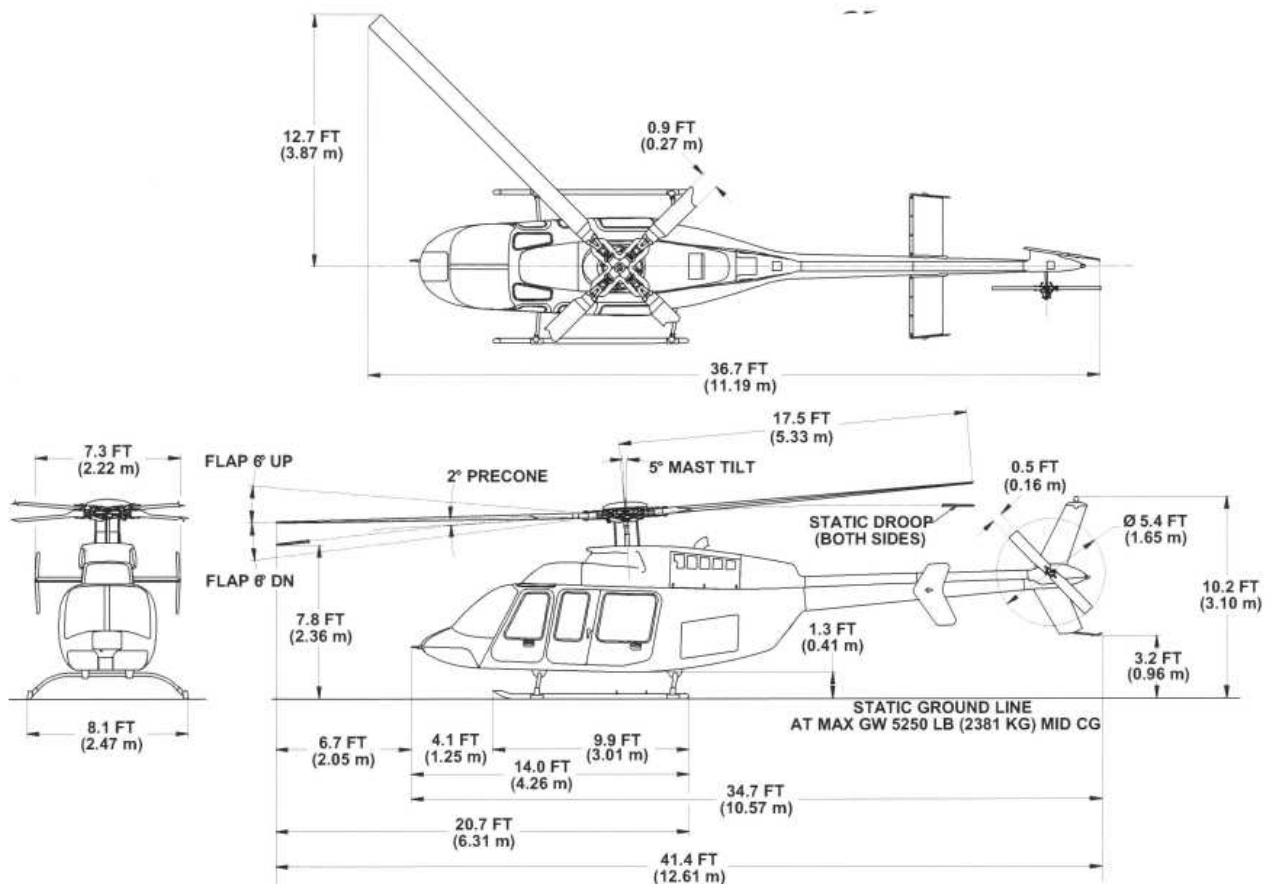
<sup>(1)</sup> V<sub>NE</sub> for altitudes from Sea Level to 3000 ft. Decrease V<sub>NE</sub> for ambient conditions in accordance with flight manual.

<sup>(2)</sup> Stated V<sub>NE</sub> applies unless placarded V<sub>NE</sub> is less.

<sup>(3)</sup> 206L-4: Maximum Density Altitude (H<sub>D</sub>) is 10,000 feet when gross weight is above 4150 pounds.

### 3.2 Exterior Dimensions of the Bell 407 & 407GX

#### Standard Low Skid Gear



#### 4. Operator Difference Requirement (ODR) Tables:

No Operator Difference Requirement tables have been produced. The EASA evaluation Team has received a difference training course proposed by Bell Helicopter Training Academy.

#### 5. Optional specific equipment:

Bell Helicopter provides Optional equipment for the Bell 407 & 407GX. (See Appendix 3).

#### 6. Master Differences Requirements:

No Master Difference Requirement tables have been produced.

## 7. Type Rating List and Licence Endorsement List

### 7.1 Type Rating List

The proposal of this OEB is to up dated Type Rating List (Helicopters) as following:

- 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 407GX	(D)	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 –Certification directorate Website and Pilot Training courses are available from the Manufacturers.

### 7.2 Licence Endorsement List

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

The table 18 “Licence Endorsement List – Type Rating List (Helicopters)”, does not content anymore the Bell 407 & 407GX. Both variants/models have being transferred into Table 9 (See paragraph 7.1 above).

## 8. Specification for Training

### 8.1 Training Courses

The assessment is based on the Bell 407 Pilot Initial Type Rating Training syllabus proposed by the Bell Helicopter Training Academy and authorised by the FAA as well as on other training syllabi Proposed by European FTOs’ already approved by NAA’s.

The OEB recommends approval of the Bell 407 initial Pilot Type Rating training syllabus.

This syllabus is divided into the following phases for approval in Approved Training Organisations, (ATO) and for operator specific training, provided the operator specific documentation is used throughout the course:

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

This revision 1 report includes the evaluation of the Bell 407GX equipped with the Integrated Avionics System (Garmin 1000H). After having flown the helicopter, the Operational Evaluation Team considers the Bell 407GX as a variant of the Bell 407 and recommends a differences training course (See paragraph 8.5.2)

## 8.2 Licensing requirements

AMC2 FCL.725 (a) of Part –FCL requires for an Initial issue of a SET (H) under 3175 Kg MTOM, an approved flight instruction of at least **5** flight hours in the helicopter or when using FTD Level 2 or 3, at least **4** hours in helicopter and at least **6** hours in total 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 aircraft type, handling characteristics, level of technology*
- *previous experience of the applicant*
- *the availability of FSTDs*

## 8.3 Initial Type rating training minimum syllabus summary

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

Initial Type Rating (ITR)		
	Bell 407	Bell 407GX
Theoretical course (Including Theoretical exam)	20h00	20H00
Flight Training Device (FTD)	-	-
Helicopter	5H00	5H00
Total FTD and Helicopter	5H00	5H00
+ Skill test	<b>Required</b>	

## 8.4 Theoretical knowledge Instruction programmes and test(s) summary

Theoretical instruction should be provided in accordance with AMC1 FCL.725 (a) Paragraph II of Part-FCL. The following sections present a summary, based on the Bell Helicopter Training Academy syllabus, of the material that an Initial Type Rating training program should cover. Training providers should ensure that their type specific courses cover the pertinent material.

Type Rating theoretical knowledge syllabus	Bell 407 & 407GX
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 (<u>including 407GX integrated avionics when required</u>)</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>	14h00
<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>	4h30
Final Theoretical Exam	1h30
<b>Total Theoretical Knowledge Syllabus Bell 407 &amp; Bell 407GX</b>	<b>20h00</b>
Optional equipment	In addition

On completion of the theoretical phase, the trainee is assessed via a multiple-choice questionnaire (*a minimum of 50 questions is recommended*) 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.



## 8.5 Flight training course and skill test

### 8.5.1 Initial Type Rating (ITR)

Helicopter Flight Training course	Bell 407 & 407GX
1. Pre-flight, cockpit, engine start, Basic air work, Flight Maneuvers, General Handling, (integrated Avionics for 407GX only)	1h15
2. Quick stop, autorotations, Hydraulic OFF procedures, Forced landings, Tail rotor failures, FADEC normal, degraded operations	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 Part-FCL - Appendix 9).	<b>Required</b>

#### Notes:

*During the flight “1”, the 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 maneuvers 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).*



## 8.5.2 Difference training course

Difference Training must be accomplished in accordance with the table below. The items listed are considered to be minimum requirements:

<b>Difference Training</b>		
<b>From Bell 407 To 407GX</b>	<b>407GX Diff. Ground school</b> Integrated Avionics (Garmin 1000H)	2H00
	<b>CBT <u>Self instruction</u></b> Integrated Systems and Display, Normal, Abnormal and Emergency procedures.	2H00
	<b>407GX FTD level 2-3 or Flight (*)</b> Integrated Systems and Display, Normal, Abnormal and Emergency procedures.	1H00
<b>From Bell 407GX To 407</b>	<b>407 Diff. Ground school</b> Engine gages and indicators. Instrument panel and pedestal. Caution and warning panel.	2H00
	<b>407 FTD level 2-3 or Flight (*)</b> Engine instruments and caution panel. Normal, Abnormal and Emergency procedures.	1H00
<b>Skill Test</b>	Not Required	

(\*) EASA Qualified FTD level 2,3 or Helicopter

Upon completion, Difference training must be recorded in the applicant's logbook and endorsed by a TRI.

## 9. Specification for Checking

### 9.1 Skill test

As required by Part-FCL - Appendix 9

### 9.2 Proficiency Checks

As required by Part-FCL - Appendix 9

## 10. Specification for Flight Simulation Training Devices

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

### Note

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

## 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

- Appendix 0: Cover
- Appendix 1: EASA- TCDS R.512\_(IM)
- Appendix 2: Part-FCL- Type rating requirements
- Appendix 3: The BTHA / Bell 407 & 407GX Pilot Ground and Flight Procedures
- Appendix 4: Compliance check-list to JAR-OPS 3 – Subpart K&L