



# EUROPEAN AVIATION SAFETY AGENCY

EXPERT DEPARTMENT / CERTIFICATION DIRECTORATE



## Operational Evaluation Board Report

Final Report - Revision 1 : 15 02 2013

**Manufacturer: EUROCOPTER**

**Twin Engine Helicopter**

**Super Puma Fleet**

**(EC 225 LP - AS 332 L1/C1 - AS 332 L1e/C1e - AS 332 L2)**

European Aviation Safety Agency

Postfach 10 12 53  
D-50452 Köln, Germany

**AS 332 L1**



**AS 332 L2**

**AS 332 L1e**



**EC 225 LP**



## Revision Record

Revision No.	Section	Pages No.	Date
Final Report	All	All	15/12/2009
Final Report - Rev 1	All	All	15/02/2013

## Contents

• Cover .....	1
• Aircraft Pictures.....	2
• Revision Record.....	3
• Contents.....	4
• Operation Evaluation Board – OPS-FCL.....	5
• Eurocopter & NAA’s experts involved in the process.....	6
• Executive Summary .....	7
• Abbreviations / Acronyms.....	9
1. Purpose and applicability.....	11
2. General Description of Puma and Super Puma Fleet .....	12
3. Helicopter Main Characteristics .....	18
4. Operator Differences Requirement (ODR) Tables .....	20
5. Optional specific equipment .....	20
6. Master Differences Requirements .....	20
7. Type Rating List and Licence Endorsement List.....	22
8. Specification for Training.....	22
9. Specification for Testing, Checking, Currency & Recent experience .....	32
10. Specification for Flight Simulation Training Device (FSTDs).....	32
11. Application of OEB report.....	33
12. Appendices .....	33

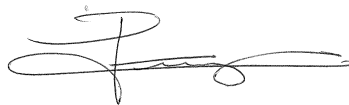
## Operational Evaluation Board – OPS / FCL Subgroup

**Jean-Marc SCAZES**

EASA – Section Manager

Operational Suitability Rotorcraft / Balloons / Airships

Experts department- Certification Directorate

A handwritten signature in black ink, appearing to read 'J. Scazes', with a stylized flourish extending to the right.

### Eurocopter Experts and NAA's involved in the Original Report (15<sup>th</sup> 12 2009)

<u>Name</u>	<u>Position</u>	<u>Office / Branch</u>	<u>Remarks</u>
<b>Michael McDOUGALL</b>	Chairman OEB	CAA United Kingdom	
<b>Hervé JAMMAYRAC</b>	Eurocopter Flight Test Pilot	Eurocopter France	
<b>Christophe MARCHAL</b>	Head of Training In Flight Training Director	Eurocopter Training Services	
<b>Gérard GAUTIER</b>	ETS - TRI / TRE Chief Flight Instructor	Eurocopter Training Services	
<b>François CHAMORRO</b>	Flight Training Engineering Training Manager	Eurocopter Training Services	

### Eurocopter Experts involved in this Revision 1 Report (21st 01 2013)

<u>Name</u>	<u>Position</u>	<u>Office / Branch</u>	<u>Remarks</u>
<b>Hervé JAMMAYRAC</b>	Eurocopter Experimental Test Pilot	Eurocopter France ETXPF	
<b>Martin BURNAND</b>	Eurocopter Training & Simulation – Standardization & Regulation	Eurocopter France EBSTS	
<b>Vincent CHENOT</b>	Super Puma, Cougar & EC225 Contract Manager	Eurocopter France EX225	
<b>William PASQUON</b>	ETS Chief Flight Instructor	Eurocopter Training Services E.ETS-V	
<b>Gilbert LE-SAINT</b>	ETS TRI-H	Eurocopter Training Services E.ETS-V	
<b>Raphael GRAND</b>	SFI & Theoretical Courses Instructor	Eurocopter Training Services E.ETS-V	
<b>François-Xavier de BENGY</b>	Eurocopter Training & Simulation – Standardization & Regulation	Eurocopter France E.EBSTS	
<b>François CHAMORRO</b>	Training Process Manager	HB Assistance Technique For E.ETS	

# Executive Summary

## 1. Manufacturer Application

The initial catch up process was conducted to check compliance of EUROCOPTER pilot training course for the initial type rating for the EC 225LP and the differences training required between the AS 332L2 and the EC 225LP. Subsequent to that work, Eurocopter has made an official request to EASA, Certification Directorate, the catch up process be extended to the AS 332 Series aircraft, to include initial Type Ratings and Difference Training courses between the types in both ways.

In April 2012 EASA Certification Directorate received another application from EUROCOPTER to evaluate the AS332 L1e/C1e helicopters in order to consider those variants as an evolution of the AS332 L1/C1 and to add this aircraft in the “**Super-PUMA fleet**”.

This “report Revision 1 “supersedes the original report called “Final Report” dated 15-12-2009.

## 2. OEB recommendations

The original report follows the previous draft document published on 15<sup>th</sup> September 2009 on EASA website and takes into account a large part of comments from the industry.

This Final report Revision 1, is based on the initial report and takes into account the AS 332 L1e/C1e helicopters. Training courses have been reviewed also to consider other category and level of FSTDs’.

The OEB recommends for approval by NAAs:

- Update Type Rating List
- Pilot Initial Type Rating Training minimum syllabus
- Pilot Additional Type Rating Training minimum syllabus
- Instrument Rating Extension
- Difference Training minimum syllabus
- Training area of special emphasis

## 3. Procedures, requirements and associated AMC references

During the initial catch up, one pilot, the chairman of the OEB team, was in current flying practice on the EC 225LP aircraft, having operated the L, L1 and EC 225LP types with commercial operator in the North Sea. Capt. J-M Sacazes has participated in the training course proposed by Eurocopter for ground instruction and completed the type rating training course for the EC 225LP, previously he operated the SA 330, AS 332L1 and also held AS 332L2 rating.

At that time EASA was conducting this OEB or catch up process in accordance with JAR-OPS 3, JAR-FCL 2 and JAR-FSTDs’ requirements. This evaluation was based on JOEB Handbook and Common procedures Document (CPD) which has been adapted to rotorcraft, 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.

For the AS 332 L1e/C1e the evaluation process has been based on JOEB handbook and Common Procedure Document (CPD), and in accordance with Part ORA, Part FCL and CS FSTD(H) requirements, including associated appendices, AMC and GM.

The EASA Section Manager “Operational Suitability Rotorcraft” attended the first theoretical difference training session delivered by the manufacturer.

EASA and EUROCOPTER experts have participated actively to this evaluation. (See page 6).

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  
Flight Group-Certification Directorate

A handwritten signature in black ink, consisting of a series of loops and strokes, positioned below the name and title.

## Abbreviations / Acronyms

AC	Alternative Current ( <i>electrical</i> )
ACAS	Airborne Collision Avoidance System
AEO	All Engine Operative
AFCS	Automatic Flight Control System
AHCAS	Advanced Helicopter Cockpit & Avionics System
AMC	Acceptable Means of Compliance
AOC	Air Operator Certificate
AP	Auto-Pilot
APIRS	Aircraft Piloting Inertial Reference System
APU	Auxiliary Power Unit
ASU	Ancillary System Unit
ATO	Approved Training Organization
ATPL (H)	Airline Transport Pilot Licence (H)
ATR	Additional Type Rating
AVCS	Active Vibration Control System
CPD	Common Procedures Document (for FAA-TCCA-FAA)
CPL (H)	Commercial Pilot Licence (H)
CRM	Crew Resource Management
CWP	Caution and Warning Panel
DC	Direct Current ( <i>electrical</i> )
DGAC	Direction Générale de l'Aviation Civile (French Civil Aviation Authority)
EASA	European Aviation Safety Agency
ECU	Engine Control Unit
EECU	Electronic Engine Control Unit
EFIS	Electronic Flight Instrument System
EGPWS	Enhanced Ground Proximity Warning System
EIU	Engine Interface Unit
EMB	Electrical Master Box
EPU	External Power Unit
ETS	Eurocopter Training Services
EU-OPS	EU-Commercial Air Transportation ( <i>Aeroplane</i> )
FADEC	Full Authority Digital Engine Control
FD	Flight Director
FLI	First Limit Indicator
FLM	Flight Manual
FMS	Flight Management System
FNPT	Flight and Navigation and Procedure Trainer
FSTD	Flight Simulation Training Device
FTD	Flight Training Device
FTO	Flight Training Organisation
GM	Guidance Material
GPU	Ground Power Unit
GPWS	Ground-Proximity Warning System
HIP	High Increase Power
IEM	Interpretative and Explanatory Material
ICS	Intercommunication Control System
IFR	Instrument Flight Rules
IGB	Intermediate Gear Box
IR	Instrument Rating
ISIS	Integrated Standby Instrument System
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
MEH	Multi Engine Helicopter
MEL	Minimum Equipment List
MET	Multi Engine Turbine
MFD	Main Flight Display
MGB	Main Gear Box
MMEL	Master Minimum Equipment List
MPAI	Multi-Purpose Air Intake
MP	Multi-Pilot
MSL	Mean Sea Level
NAA	National Aviation Authority
NAAs	National Aviation Authorities
N/A	Not Applicable
ND	Navigation Display
NMD	Navigation & Mission Display
ODR	Operator Differences Requirement
OE	Operational Evaluation
OEB	Operational Evaluation Board
OEI	One Engine Inoperative
PFD	Primary Flight Display
PPL (A)	Private Pilot License ( <i>Aeroplane</i> )
PPL (H)	Private Pilot License ( <i>Helicopter</i> )
PSU	Pressure Sensor Unit
RFM	Rotorcraft Flight Manual
RPM	Revolutions per Minute
TGB	Tail Gear Box
SCU	System Control Unit
SEMA	Smart Electro-Mechanical Actuators
SEP (H)	Single Engine Piston ( <i>Helicopter</i> )
SET (H)	Single Engine Turbine ( <i>Helicopter</i> )
SP	Single-Pilot
TAWS	Terrain Awareness & Warning System
TCAS	Traffic alert & Collision Avoidance System
TRI	Type Rating Instructor
T/R	Tail Rotor
TRTC	Type Rating Training Course
TRTO	Type Rating Training Organisation
VEMD	Vehicle and Engine Multifunction Display
VMS	Vehicle Monitoring System
VNE	Velocity Never Exceed
Vy	Optimum climbing speed
VFR	Visual Flight Rules

### Helicopter Model designators along historic evolution within EADS group

- **AS:** Aérospatiale
- **BO:** Bölkow (MBB / Messerschmidt-Bölkow-Blohm)
- **BK:** Bölkow-Kawasaki
- **EC:** Eurocopter
  - **EC** Eurocopter
  - **ECD** Eurocopter Deutschland
  - **ECE** Eurocopter España
- **SA:** Sud-Aviation
- **SE:** Société Nationale de Constructions Aéronautiques du Sud-Est
- **SO:** Société Nationale de Constructions Aéronautiques du Sud-Ouest

## I. Purpose and applicability

The initial version of this report is based upon an evaluation of the Eurocopter Initial and additional Type Rating courses and differences courses as by EC and substantiated by the differences courses and Initial Type Rating courses provided by Bristow Helicopters Ltd and CHC Scotia Limited.

Data is being submitted by Eurocopter in support of the initial Operational Evaluation concerning differences between the AS332, AS332 L2 and EC225 LP.

In addition the manufacturer provided a new comparison between the different variants including the AS332 L1e/C1e equipped with AHCAS. The operator difference tables (ODR) provided by the manufacturer include now a comparison of the entire "**Super-PUMA fleet**" (See *Appendix 3*)

This document:

- Provides a general description of the Super-PUMAs fleet
- Updates Type Rating List assigned to the AS332 L1/C AS332 L1e/C1e - AS332 L2- EC 225 LP
- Makes recommendations for:
  - initial type rating (ITR)
  - additional type rating (ATR)
  - Instrument Rating Extension (IR)
  - differences training
  - Training area of special emphasis

*Note:*

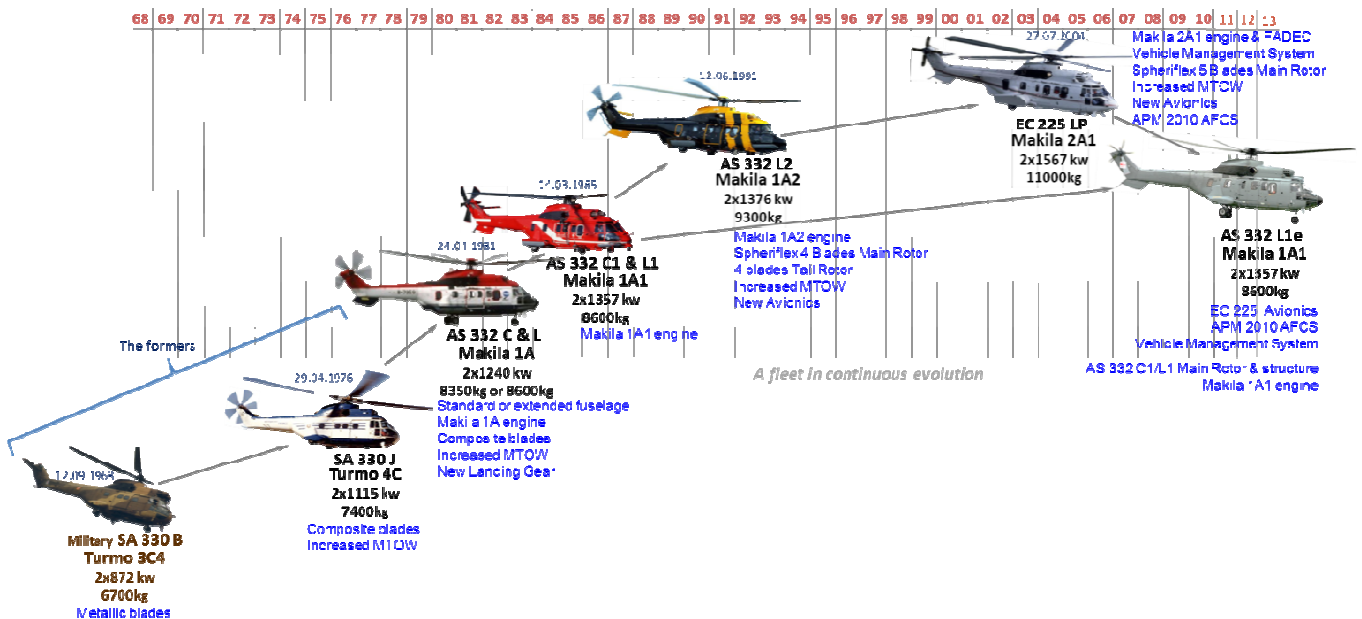
- AS 332 L1e/C1e is a commercial denomination for AS 332 L1/C1 post-modification AHCAS, associated with digital AFCS "APM 2010".
- *Even if the SA 330 "Puma" is a precursor of the Super Puma fleet, it is recognized as a different type. The Manufacturer does not request any evaluation for the former SA 330.*
- *This fleet is presented in the TCDS of 2012, June, 29<sup>th</sup>: EASA-TCDS-R.002\_Eurocopter\_SA330--AS332--EC225LP (See Appendix 1)*

## 2. General Description of Puma and Super Puma fleet

The SA330, AS332 C, L, C1, L, L1e & C1e, AS332 L2 and EC225 LP belong to the **“Puma & Super Puma”** fleet. They all are heavy twin engine helicopters (*with 19 passengers’ seats on standard aircrafts & 24 passengers’ seats on stretched aircrafts*) powered by 2 turbo-shaft engines.

Those helicopters are approved under the TRANSPORT category of JAR/FAR PART 29 and are basically approved for day and night, VFR and IFR operations.

Their commercial designation is: Super PUMA (AS332, AS332L1e/C1e, AS332L2 and EC225).



Here illustrated, the successive evolutions of the “PUMAs & Super-PUMAs fleet”.

### General

#### SA 330 (F, G & J) original aircraft

(National Certification Date: 29 April 1976)

Upon Eurocopter request, the Type Certificate of both models **SA330 G** and **SA330 F** has been **revoked** by EASA as of 12 November 2009 (EASA Certification Information of 16 November 2009).

*Due to the fact that SA330 variants/models are not evaluated in this OEB process, only AS332 L1/C1, AS332 L1e/C1e, AS332 L2 and EC225 LP variants/models are considered in this document.*

### **AS 332 (C, L, C1, L1) VARIANTS:**

National Certification Date: C: 24 April 1981 - L: 02 Dec 1981 - C1/L1: 14 March 1985

Minimum crew is: IFR: 2 pilots / VFR: 1 Pilot and a qualified crew member.

Except for L1&C1: VFR above 20.000 ft: 2 Pilots.

AS332 (L, C, L1 and C1) have the following main characteristics:

- a) Engine governing is insured by a N2 electronic governing system and a N1 hydro-mechanical system.
- b) Electro/Dual AP with or without Coupler 3axes or 4 axes. Conventional Flight Display & Instrument panel, but recent versions can be equipped with electronic displays (VMS, EFIS and D.MAP) compatible with modern AFCS and Flight Management System.
- c) Main Rotor Head is of conventional manufacturing. Blades are made of composite material.
- d) Tail Rotor Head is identical to SA330's, with the same four blades design, the pitch incidence variations are controlled via control rod on an external pitch change spider.

Considering the very slight differences between the AS332 L, C, L1 and C1 models, only familiarisation training (*reading of the Flight Manual*) is necessary to convert from one of these aircraft to another. The differences between AS332 L, C, L1 and C1 models are summarised in the table 1.

**In this report, these four variants/models (L, C, L1 and C1) are named AS332.**

### **AS332 L1/C1 post-modification with AHCAS (called AS332 L1e&C1e):**

National Certification Date: 2012, 06, 25<sup>th</sup> (ref. 100040136 / Major Change Approval).

Minimum crew is: IFR: 2 pilots / VFR: 1 Pilot.

The AS332 L1e&C1e have the following main characteristics:

- a) to d): Identical to AS332, except:
- b) State-of-art Integrated 4 MFDs Flight Display System, **identical to EC225 LP**, associated with an advanced Dual/Duplex 4 axes digital Automatic Flight Control System and Flight Management System, and a Vehicle Monitoring System (VMS).

Considering the very slight differences between AS332 L1e and AS332 C1e models, only familiarisation training (reading of the Flight Manual) is necessary to convert from one of these aircraft to the other. The slight differences between AS332 C1e & L1e models are summarised in table 1.

**In this report, these two variants/models (L1e and C1e) are named AS332e.**

### **AS332 L2 variant:**

National Certification Date: 12 June 1991

Minimum crew is: IFR: 2 pilots / VFR: 1 Pilot.

The **AS332 L2** has the following main characteristics:

- a) The engine governing is insured by a DECU governing system.
- b) The cockpit is equipped with an Integrated Flight Display System, associated with a dual digital 4 axes Automatic Flight Control System and Flight Management System.
- c) A 4-blades SPHERIFLEX Main Rotor Head provides for the three basic hinge functions: pitch, flapping and drag. The SPHERIFLEX Main Rotor Head elastomeric concepts don't need any lubrication.

**EC225 LP variant:**

EASA Certification Date: 27 July 2004

Minimum crew is: IFR: 2 pilots / VFR: 1 Pilot

*Note: for optional Water Bombing Day VFR Operations: 1 Pilot & 1 suitably trained Crew Member.*

The **EC225 LP** has the following main characteristics:

- a) The engine governing is insured by a dual FADEC governing system,
- b) A state-of-art Integrated 4 MFDs Flight Display System, associated with an advanced Dual/Duplex 4 axes digital Automatic Flight Control System and Flight Management System, and a Vehicle Monitoring System (VMS),
- c) A 5-blades SPERIFLEX Main Rotor Head,
- d) Tail Rotor Head Identical SPERIFLEX as the AS332 L2.

## Description

### Structure

The fuselage is of light alloy monocoque design with stressed skin and frames and includes, from nose to aft:

- The cockpit and the main structure (the cabin),
- The intermediate structure,
- The tail structure.

### Seating

In the cockpit, the two crashworthy pilots seats are adjustable. Optional third crew-member seat, crashworthy or not crashworthy version, can be installed.

### Main Rotor

The four resin-glass laminate rotor blades (five for EC225 LP variant/model) are secured to the rotor hub by two pins locked by safety pins. They can be equipped with electrical resistors built in the mat covering the leading edge for a flight during icy conditions.

### Main Rotor Drive system

The MGB transmits the power from the engines to the rotors and reduces the rotation speed. The MGB is attached to the structure by 3 rigid bars which transmit to the structure, in flight, the rotor lift, on the ground, the weight of the rotor and MGB. At the bottom of the MGB is fitted a flexible mounting plate, secured on the structure, which picks up the main rotor reaction torque and the longitudinal and transverse loads, while damping the vibrations.

**Engine-to-MGB coupling:** The MGB receives the energy coming from the engines through steel shaft on which two flexible diaphragms extremities can be distorted to take up the slight misalignments between the engines and the MGB. The drive-shafts rotate inside engine-to MGB coupling tubes.

**MGB lubrication monitoring:** The MGB gears and bearings are lubricated and cooled by pressurized oil. A main system is supplied by the main pump and passes through the heat exchanger.

In the event of a main pump pressure drop, an emergency pump outputs directly into the lubrication system without passing through heat exchanger. On EC225 LP, in addition:

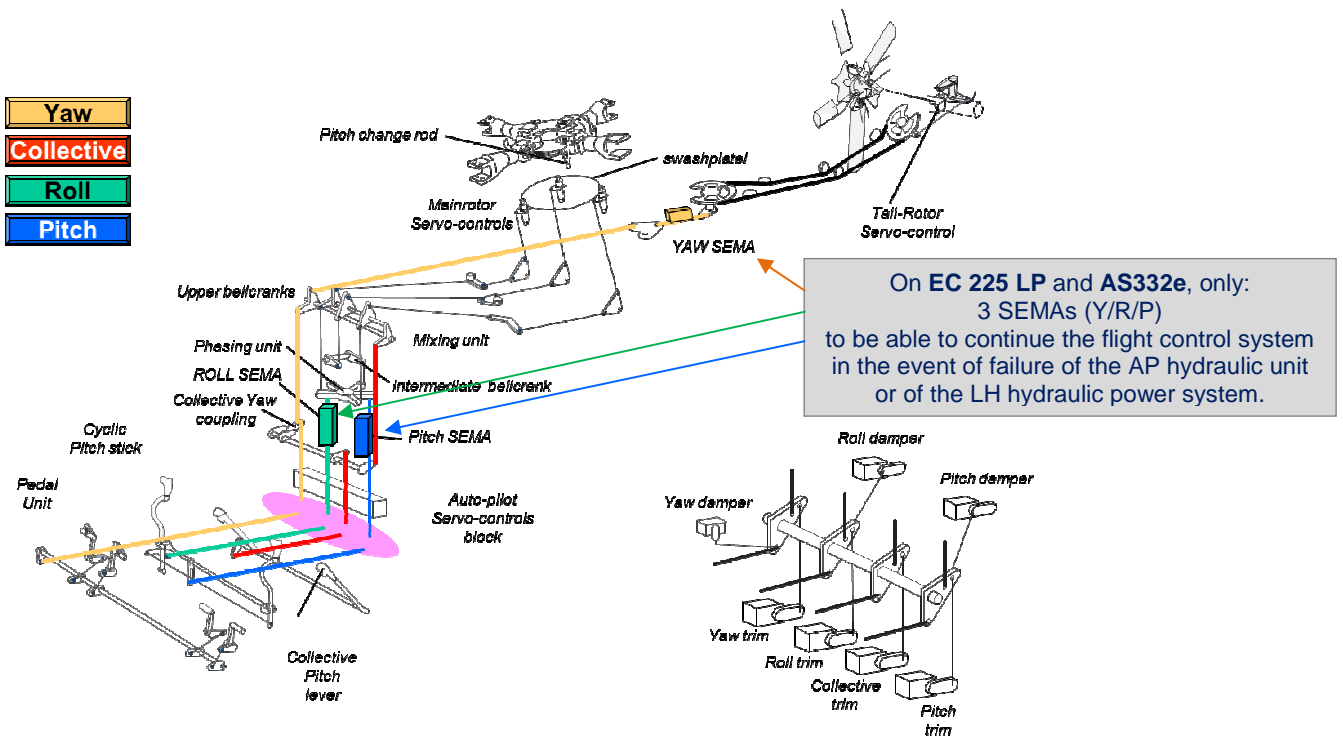
- One **S/BY COOLER** for the S/BY PUMP,
- One **EMY/LUB SYS** for 30' of lubrication, in case of total pressure failure.

**Rotor brake**

The rotor brake is controlled hydraulically from the LH Hydraulic system. The rotor brake device is installed on the rear transmission shaft, just behind the MGB.

**Flight controls & Pilot and Co-pilot sticks**

- From the cyclic pitch sticks, two separate control channels (fore-&-aft and lateral) drive the phasing unit via the AP hydraulic unit which, from a control linkage standpoint, may be considered as a simple de-multiplying bellcrank.
- From the collective pitch levers, a control channel drives the mixing unit shaft lever via the AP hydraulic unit. Motion is transmitted by the summing bellcrank which rotate by the same amount, driving the three swashplate control rods.



### Engine

Separated by a fire-wall ahead of the MGB, the two turbo-shaft engines are installed on the mechanical deck. Even if the Makila engines delivers different power values (*presented in general description*), the modular design still the same:

### Engine controls

- On **AS332**, **AS332e** and **AS332 L2**, for each engine, the Throttles enables automatic or manual starting of the engine, the increase in power rating after starting and manual fuel flow control in the event of governing failure.

- On **EC225 LP**, the Engine Interface Units [EIU(s)] enable the interface between the engine and the FADEC(s) which relate to the torque values, the collective pitch position and the yaw pedal position.

For all the variants/models, the collective pitch-anticipator eliminates the governor static droop and reduces the engine response time when the collective pitch value is changed.

### Fuel system

There are two groups of fuel tanks: 1 per engine. The engine fuel systems are completely separate:

- The group 1 (*LH longitudinal and 2 rear tanks*) supplies the Engine 1.

- The group 2 (*RH longitudinal and 2 forward tanks*) supplies the Engine 2.

(*Note: on AS332 standard fuselage and AS332 C1e, the group 2 comprises the longitudinal RH tank and one forward tank only*).

- The longitudinal tank is the feeder tank, equipped with two booster pumps.

- The amount of fuel in each group can be balanced in flight by means of a transfer pump.

### Hydraulic system

All the variants/models are equipped with two hydraulic systems:

- The **LH hydraulic system** supplies the upper cylinders of the main servo-controls and the LH cylinder of the tail servo-control and the other hydraulic power consumer of the aircraft (*L/G retraction/extension, Wheel brakes, Rotor brake, Automatic Pilot, optional Hoist*).

- The **RH hydraulic system** supplies the lower cylinders of the main servo-controls and the RH cylinder of the tail servo-control. The hydraulic mechanical pump is driven by the MGB.

### Electrical system

- The AC generation system comprises two alternators, driven by the MGB, to delivers 115V-400Hz, and two transformers to delivers 26V-400Hz,

▪ For AS332 L2 only 1 transformer to delivers 26V-400Hz,

▪ For EC225 LP and AS332e: no 26 V-AC transformer.

- The DC generation system comprises two transformer-rectifiers energized by AC systems, one 28V main battery, and one stand-by battery which energizes users (stand-by horizon, stand-by lighting...) in case of total failure of generators.

- **AS332 L2 & EC225 LP** are equipped with another Alternator and a Transformer-Rectifier energized by an APU, or a Hydro-Alternator supplied by the LH hydraulic system.

- The electrical controls are located on the overhead panel.

### Instrument panel

- Except for some recent aircrafts equipped with the optional 4 x 4 inches **PFD-ND** MFD 255 and the **VMS**, (*Vehicle Monitoring System*) **AS332** variants/models are basically equipped with a conventional instrument panel.
- **AS332 L2** is equipped with an “Avionique Nouvelle” 6 x 6 inches **PFD&NMD** (*Navigation-Mission Display*).
- **AS332e** and **EC225 LP** are equipped with an “AHCAS” 6 x 8 inches **PFD&NAV-D** (*Navigation Display*) with their controls units, and the **VMS**.

**AS332:**



**AS332 with STCs' MFD 255, VMS & D.Map**



**AS332 L2:**



**AS332e:**



**EC225 LP:**



### 3. Helicopter main characteristics

#### 3.1 Sum up of the main characteristics of the Super-PUMAs fleet:

			AS332C	AS332 L	AS332 C1	AS332 L1	AS332 C1e	AS332 L1e	AS332 L2	EC225
Dimensions	Fuselage	Length	15,53 m	16,29 m	15,53 m	16,29 m	15,53 m	16,29 m	16,79 m	identical
		Width	3,79 m	identical	identical	identical	identical	identical	3,86 m	4,10 m
		Height	4,94 m	4,95 m	4,94 m	4,95 m	4,94 m	4,95 m	4,97 m	identical
	Main rotor	Dia- meter	15,60 m	identical	identical	identical	identical	identical	16,20 m	identical
	Tail rotor		3,051 m	identical	identical	identical	identical	identical	3,15 m	identical
Engines	Models (all Turboméca) (kW MCP)		Makila 1A 1130 kW	identical	Makila 1A1 1185 kW	identical	identical	identical	Makila 1A2 1236 kW	Makila 2A or 2A1 1395/1410
Fuel tanks	Capacity		1541 l	2024 l	1541 l	2024 l	1541 l	2024 l	2012 l	2908 l
Air Speed	Power ON	Abste VNE	167 kt	identical	identical	identical	identical	identical	170 kt	175 kt
	Power OFF		145 kt	identical	identical	identical	identical	identical	150 kt	identical
Rotor Speed	Power ON	AOE	265 rpm	identical	identical	identical	identical	identical	identical	265/275 rpm
	Auto-rotation	OEI	290 rpm	identical	identical	identical	identical	identical	identical	identical
Maximum Operating		Pres- sure Altitude	20 000ft	identical	25 000ft	identical	identical	identical	20 000ft	identical
MTOW with Internal load			8 600 Kg	identical	identical	identical	identical	identical	9 300 kg	11 000 Kg
MTOW with External load			9 350 kg	identical	identical	identical	identical	identical	10 500 Kg	11 200 kg
Category A	Density Altitude	Clear Heliport	8000 ft	identical	identical	identical	identical	identical	7200 ft	7 400 ft (*)
		VTOL ops	8000 ft	identical	identical	identical	identical	identical	6200 ft	7 400 ft (*)

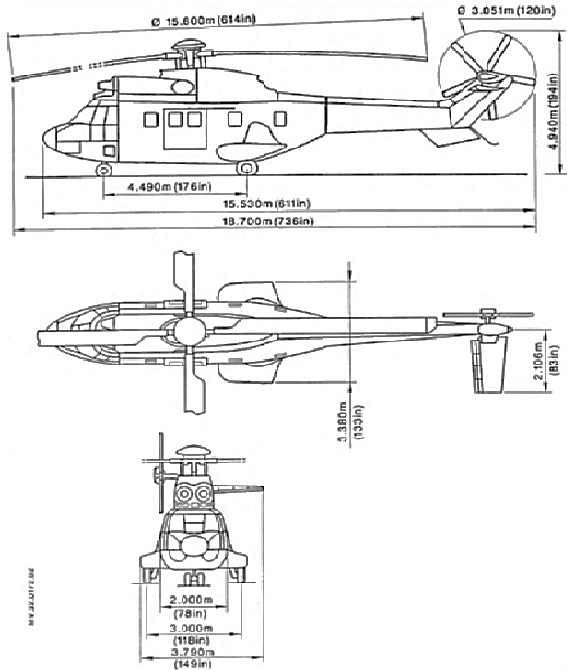
**Table 1**

Note:

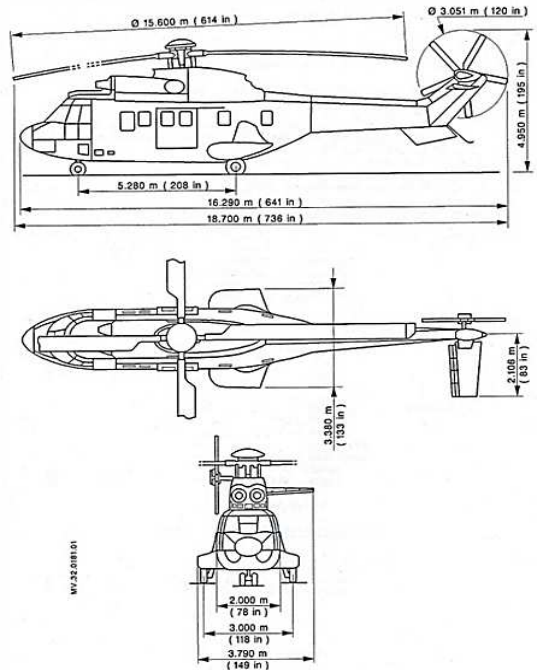
- Table is read column by column, from left to right.
- (\*): 11 000 ft when aircrafts are equipped with MPAI

3.2 External helicopters dimensions

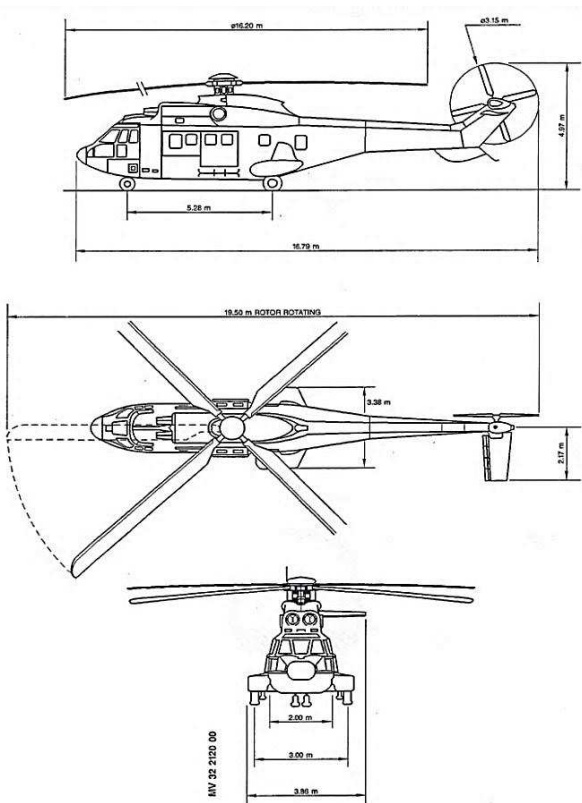
**AS332 C, C1&C1e**



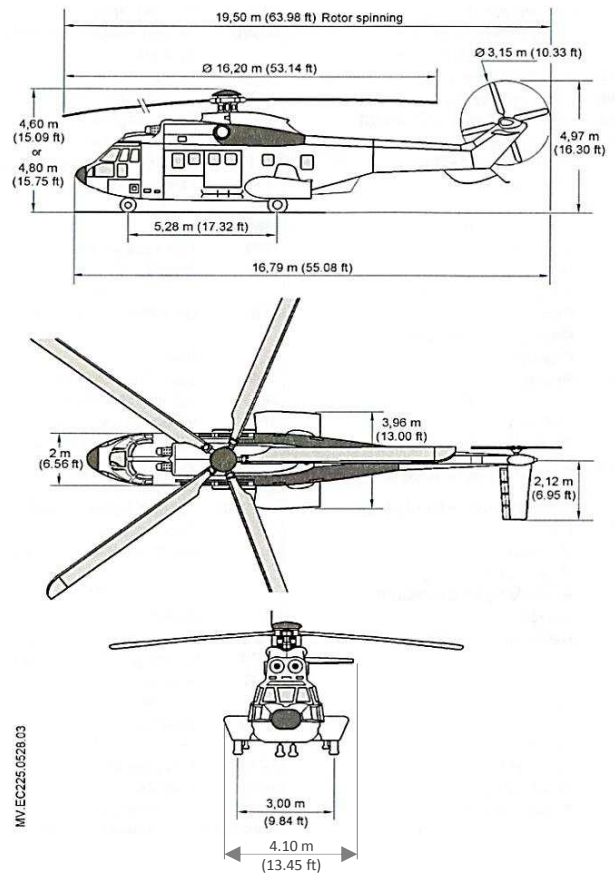
**AS332 L, L1&L1e**



**AS332 L2**



**EC225 LP**



## 4. Operator Difference Requirement (ODR) Tables

Operator Difference Requirement tables have been produced by Eurocopter to support to the initial OEB for AS 332 L1, AS 332 L2 & EC 225 LP, based on Pilot Initial Type Rating Training syllabus. The OEB proposed to maintain license endorsement unchanged, but does propose significant changes in ODR tables regarding Manoeuvres to cover training, checking and recent experiences for CAT A / Performance Class 1 for Helipad, rejected take-off and ground cushion and associated manoeuvres including glass cockpit, electronic instruments, new dedicated concepts and other elements as it is mentioned in paragraph.

For this “report Revision 1 “, all ODR tables have been reviewed by the manufacturer to include the AS332L1e/C1e in the fleet and to evaluate differences level of training, checking and currency between all variants AS332, AS332e, AS 332 L2 & EC 225 LP. (see Appendix 3).

## 5. Optional specific equipment

Optional equipment for AS332, AS332e, AS332 L2 and EC225 LP is provided by Eurocopter Manufacturer. Some optional equipment requires additional training (See Appendix 3).

## 6. Master Differences Requirements:

### 6.1 Difference Level Summary

The Common Procedures Document (CPD) describes one acceptable method and guidelines for conducting an Operational Evaluation of an aircraft type or a variant certificated. As such the document offers an acceptable method for compliance with the intent of the applicable regulatory requirements.

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)

PC = means Proficiency Check (i.e. LST, LPC or OPC)

Full Flight Simulator or aircraft may be used to accomplish specific manoeuvres

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

The Common Procedures Document has been established basically for fixed wing evaluations, so it appears that adaptations and alleviations to comply with JAR-FCL and to PART-FCL regulation, specific elements dedicated to helicopter are necessary.

Numbers of regulatory OPS / FCL and operational aspects concern typically helicopter matters like:

- At least one hour flying time for Multi Engine type difference training
- Dual certification for the same helicopter type (Single Pilot VFR and Multi Pilot IFR)
- No Helicopter class Rating
- Limited number of available Flight Simulation Training Device
- Helicopter Full flight simulators are not zero-flight time training devices nowadays.

The Master Difference Requirement tables (MDR) for AS 332, AS 332e, AS 332 L2 and EC 225 LP have been basically produced by Eurocopter.

The OEB has considered significant changes in MDR tables mainly regarding Manoeuvres to cover training, checking and recent experiences for CAT A / Performance Class 1 for CAT A for Helipad, rejected take-off and ground cushion and associated manoeuvres including glass cockpit, electronic instruments, new dedicated concepts and other elements as it is mentioned in paragraph 8.7 of this report.

	<i>FROM HELICOPTER</i>				
		<b>AS332</b>	<b>AS332e</b>	<b>AS332 L2</b>	<b>EC225 LP</b>
<i>TO HELICOPTER</i>	<b>AS332</b>		<b>E/D/D</b>	<b>E/E/D</b>	<b>E/E/D</b>
	<b>AS332e</b>	<b>E/D/D</b>		<b>E/D/D</b>	<b>D/C/C</b>
	<b>AS332 L2</b>	<b>E/E/D</b>	<b>E/D/D</b>		<b>D/D/C</b>
	<b>EC225 LP</b>	<b>E/E/D</b>	<b>D/C/C</b>	<b>D/D/C</b>	

Although Master Differences Requirements are at levels **E/E/D**, the CUOEB has considered the Super Puma family helicopter, and recommend to classified AS 332, AS 332e, AS 332 L2 and EC 225 LP as "significantly different variants" and not as different types.

Operators and National Aviation Authorities should have a close control over flying dual variant as mentioned in AMC1 ORO.FC.240 (Operation on more than one type or variant) (See Appendix 2):

## 7. 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
<i>Eurocopter</i>			
<i>- ME Turbine -</i>	AS332 (C, C1, L, L1)	(D)	AS332 / EC225
	AS332e (C1e, L1e)		
	AS332 L2		
	EC225 LP		

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 –Expert Department / Certification Directorate Website and Pilot Training courses are available from the Manufacturers

## 8. Specification for Training

### 8.1 General

The CUOEB has compared courses provided by commercial operators with the requirements of EASA Flight Crew Licensing requirements and those of ETS. Commercial operators might, on comparison identified areas in which their courses did not exactly match the proposals of this CUOEB. Due to the variety of courses available this was considered inevitable, however it is recognized that commercial operators provided training that is integrated into their commercial, operational and contractual requirements which will probably exceed basic training.

Furthermore a number of Off-shore commercial operators of these types of helicopters have TRTO able to provide similar courses. Such courses are integrated into the operator's training regime and although they are broadly similar to those of ETS, they usually include specific operational training into their training package. These organizations however, usually only provide training to persons in their employment.

The CUOEB reviewed the course content and structure proposed by the manufacturer for the various type rating and differences courses. It is acknowledged that the manufacturer will be expected to provide courses that cater for varying pilot backgrounds, knowledge, culture and experience and which are both adaptable and flexible in the training provision. All were considered thorough and entirely reasonable and are described in brief below.

Operators who are in doubt as to the suitability of their courses, or where there are significant differences from the recommendations of this report should seek the advice of their national regulatory authority.

Operators Multi pilot training courses should be considered as other means of compliance as far as operational flying training and difference training elements are integrated in the course. Such courses will not be less than the basic training established by this report.

The initial CUOEB has confirmed that the type Rating Training courses proposed by EUROCOPTER for the AS332, the AS332 L2 and the EC225 LP fulfilled the minimum requirements of EASA Part-FCL.

Based on the initial OEB Report (15th 12 2009) EUROCOPTER has reviewed all the type Rating Training courses of the “Super-PUMA fleet” and has included also the AS332 L1e/C1e . Those courses now take into account different level of FSTD’s including FFS’s and FTD’s.

The OEB recommends pilot type rating training courses are divided into the following phases for approval in Approved Training Organisations and also for operator specific training, provided the operator specific documentation is used throughout the course.

## 8.2 Course pre-entry requirements

### 8.2.1. Initial type rating

All candidates must fulfil the requirements of Part-FCL.725 for the issue of class and type rating and those of PART-FCL.720.H specific for the issue of an initial multi-engine, single or multi-pilot helicopter.

### 8.2.2. Additional type rating

Candidates for an additional type rating must:

- Hold a valid MET MP type rating for a multi-pilot type rating or;
- Hold a valid MET SP type rating for a single pilot type rating;

### 8.2.3. Difference training courses

Difference training courses applies for privileges extension to another variant of aircraft within the AS332/EC225 type rating (see Part-FCL.710 (a)). The applicant must:

- Hold a valid AS332/EC225 type rating.

### 8.2.4. IR extension

All multi-pilot helicopter IFR extension candidates must:

- Hold a first multi-pilot qualification or be able to show a certificate of completion of a Multi-Crew Cooperation course (MCC),
- Hold a valid IR-H for Multi-Engine helicopter,
- Satisfy to the prerequisites stated in Part-FCL.610 IR,

All elements of Section 5 of the skill test to Appendix 9 to Part-FCL.630.H IR(H) (b) (Instrument flight procedures) should be covered during the training.

## 8.3 Licensing requirements

All students must fulfil the requirements of Part FCL– Appendix 9 Flight Instruction and Skill Test.

The minimum flight training time is stated in Part-FCL AMC2 FCL.725 (a). These requirements have to be considered as the bare minimum. The amount of flight instruction necessary to achieve training objectives depends on:

- Complexity of the helicopter type, handling characteristics, level of technology;
- Category of helicopter (*SEP or SET helicopter, multi-engine turbine and multi Pilot helicopter*);
- Previous experience of the applicant;
- The availability of FSTDs.

## 8.4. Theoretical knowledge Syllabus and Test summary

Theoretical knowledge instruction should be provided in accordance with Part-FCL Subpart H Section 1 FCL.710.

The following sections present a summary of the material a Type Rating Training programme should consider. Whilst based on the ETS programme, training providers should ensure their type specific courses cover the pertinent material.

### 8.4.1 Initial and additional Type rating

Type Rating Theoretical knowledge syllabus (1)	AS332	AS332e/EC225	AS332 L2
1. Approved pre-entry course for a first MET type rating	18h00 (2)		
2. Helicopter structure, transmissions, normal and abnormal operation of systems	26h00		
3. Limitations	2h00		
4. Performance, Flight Preparation and Control	5h00		
5. Weight and Balance – Servicing on ground	2h00		
6. Emergency Procedures	4h00		
7. Electronic flight instrument systems (Avionics and systems)	N/A	12h00	9h00
8. Optional Equipment	In addition		
9. IFR Extension: Theoretical revision program	3h00 (3)		
Theoretical Exam	3h00		
<b>TOTAL for theoretical type rating training &amp; exam</b>	<b>63h00</b>	<b>75h00</b>	<b>72h00</b>

(1) Theoretical instruction elements can be covered during theoretical training course and/or during flight training briefing phase.

(2) The pre-entry course does not apply to additional type rating, or to candidates having passed the ATPL (H) theoretical knowledge examinations.

(3) IR MP Extension is waived for VFR Type Rating training.

## 8.4.2 Difference training in between variants

Theoretical knowledge syllabus for difference Training (1):	AS332	AS332e/EC225	AS332 L2
1. Helicopter structure, transmissions, normal and abnormal operation of systems	20h00 (2)		
2. Limitations	2h00 (2)		
3. Performance, Flight Preparation and Control	5h00 (2)		
4. Weight and Balance – Servicing on ground	1h00 (2)		
5. Emergency Procedures	4h00		
6. Electronic flight instrument systems (Avionics and systems)	N/A	12h00 (3)	9h00 (4)
7. Optional Equipment	In addition		
Theoretical Exam	1h00 (5)		
<b>TOTAL for theoretical type rating training &amp; exam</b>	<b>33h00</b>	<b>45h00</b>	<b>42h00</b>

- (1) Theoretical instruction elements can be covered during theoretical training course and/or during flight training briefing phase.
- (2) For difference training between AS332 and AS332e, only 8h00 total (instead of 28h00) are needed to cover items 1, 2, 3 and 4.
- (3) To cover item 6, between AS332e and EC225, only 3h00 are needed.  
From AS332L2 to AS332e/EC225, only 10h00 are needed.
- (4) To cover item 6, from AS332e/EC225 to AS332L2, only 6h00 are needed.
- (5) For some courses, up to 2h00 can be necessary for the exam.

## 8.5 Flight training course summary

### 8.5.1. General

Part-FCL in AMC2 FCL.725 (c) and (d) mandates the minimum duration for MET initial and additional type rating training.

The following tables summarise the minimum training hours required for each Type Rating, with and without integrated IR and for Difference training courses. Standard flight sessions can be extended or reduced at the discretion of the instructor. Additional flight could also be necessary if the trainee has not successfully demonstrated the ability to perform all manoeuvres with a sufficient degree of proficiency. All this could result in total course length significantly different from amounts given below.

Additional flights may also be performed by ATO to enhance basic initial type rating training (minimum syllabus) for different purposes:

- For operations in hostile and congested environment
- In multi-pilot or even more in mixed single-pilot / multi-pilots environments, for PF/PNF duties training (this should be carried out in FSTD's where CRM techniques can be properly trained and assessed),
- Depending on the specific configuration of the aircraft used,
- On request of customers.

Where ATOs integrate type rating training into an operator's commercial training requirements, the figures proposed below may be integrated into the operator's training package. Furthermore CRM, MCC and Line training should provide additional training benefit, which should be aggregated and acknowledged.

### 8.5.2 Initial Type Rating courses summary

- Initial Multi-Pilot / IR Type Rating (MP/IR) and
- Single-Pilot / VFR Type Rating (SP/VFR).

Initial Type Rating (ITR)						
	MP / IR			SP / VFR		
	Helicopter only	Helicopter + FSTD (1)	Helicopter + FSTD (2)	Helicopter only	Helicopter + FSTD (1)	Helicopter + FSTD (2)
<b>Helicopter</b>	19h00	3h00	4h30	12h00	2h00	4h00
<b>FSTD (1)</b>		16h00			10h30	
<b>FSTD (2)</b>			15h00			10h30
<b>TOTAL</b>	<b>19h00</b>	<b>19h00</b>	<b>19h30</b>	<b>12h00</b>	<b>12h30</b>	<b>14h30</b>
<b>Skill Test</b> <i>In accordance with Part FCL Appendix 9</i>	required	required	required	required	required	required

(1) *FFS level C or D, or FSTD's having dual qualification FFS Level B and FTD Level 3 (see § 10),*

(2) *FTD Level 2/3,*

### 8.5.3 Additional Type Rating courses summary

- Additional Multi-Pilot / IR Type Rating (MP/IR) and
- Single-Pilot / VFR Type Rating (SP/VFR).

Additional Type Rating (ITR)						
	MP / IR			SP / VFR		
	Helicopter only	Helicopter + FSTD (1)	Helicopter + FSTD (2)	Helicopter only	Helicopter + FSTD (1)	Helicopter + FSTD (2)
<b>Helicopter</b>	13h30	2h00	4h30	10h30	1h30	3h00
<b>FSTD (1)</b>		13h30			9h00	
<b>FSTD (2)</b>			12h00			9h00
<b>TOTAL</b>	<b>13h30</b>	<b>15h30</b>	<b>16h30</b>	<b>10h30</b>	<b>10h30</b>	<b>12h00</b>
<b>Skill Test</b> <i>In accordance with Part FCL Appendix 9</i>	required	required	required	required	required	required

(1) *FFS level C or D, or FSTD's having dual qualification FFS Level B and FTD Level 3 (see § 10),*

(2) *FTD Level 2/3,*

Notes:

ATOs implementing FSTDs in their training courses should observe the following recommendation:

For the particular situation of AS332e which avionics and AFCS are nearly identical to the ones of EC225, usage of an FSTD EC225 type specific can be accepted by authorities. However, credit should be limited to two hours.

### 8.5.4. Difference training courses VFR and IR Extension:

The Difference training courses ( $\Delta$ ) are for single pilot VFR type rating.

Should the candidate require a multi-pilot rating, intending to operate the aircraft under IFR and in the multi-pilot role, the additional Multi Pilot IR Extension is required, and a theoretical revision program of a minimum 3h00 has to be insured before flights.

**Note:**

Part-FCL in AMC2 FCL.725 (d) only mandates 1 hour in helicopter for difference training on Multi-Engine Turbine. This is clearly inadequate for such complex aircraft. Approved Training Organisations shouldn't be below training times given below.

Difference Training ( $\Delta$ ) – From <b>SP</b> type rating to <b>SP</b> type rating												
	$\Delta$ 1		$\Delta$ 2		$\Delta$ 3		$\Delta$ 4		$\Delta$ 5		$\Delta$ 6	
	From AS332 to AS332e		From AS332e to AS332		From AS332 to AS332 L2		From AS332 L2 to AS332		From AS332 to EC225		From EC225 to AS332	
	Hel only	Hel & FSTD	Hel only	Hel & FSTD	Hel only	Hel & FSTD	Hel only	Hel & FSTD	Hel only	Hel & FSTD	Hel only	Hel & FSTD
<b>Helicopter</b>	4h30	1h30	5h30	1h30	6h00	1h30	6h00	1h30	7h30	1h30	8h00	2h00
<b>FSTD (1)</b>	<del>X</del>	3h00	<del>X</del>	4h00	<del>X</del>	4h30	<del>X</del>	4h30	<del>X</del>	6h00	<del>X</del>	6h00
<b>TOTAL VFR</b>	4h30	4h30	5h30	5h30	6h00	6h00	6h00	6h00	7h30	7h30	8h00	8h00
<b>MP IR EXTENSION (2)</b>	<b>3h00</b>	<b>3h30</b>	<b>4h00</b>	<b>4h30</b>	<b>3h00</b>	<b>3h30</b>	<b>4h00</b>	<b>4h30</b>	<b>3h00</b>	<b>3h30</b>	<b>4h00</b>	<b>4h30</b>

	$\Delta$ 7		$\Delta$ 8		$\Delta$ 9		$\Delta$ 10		$\Delta$ 11		$\Delta$ 12	
	From AS332 L2 to AS332e		From AS332e to AS332 L2		From AS332 L2 to EC225		From EC225 to AS332 L2		From AS332e to EC225		From EC225 to AS332e	
	Hel only	Hel & FSTD	Hel only	Hel & FSTD	Hel only	Hel & FSTD	Hel only	Hel & FSTD	Hel only	Hel & FSTD	Hel only	Hel & FSTD
<b>Helicopter</b>	4h30	1h30	5h30	1h30	4h30	1h30	5h30	1h30	3h00	1h30	3h00	1h30
<b>FSTD (1)</b>	<del>X</del>	3h00	<del>X</del>	4h00	<del>X</del>	3h00	<del>X</del>	4h00	<del>X</del>	1h30	<del>X</del>	1h30
<b>TOTAL VFR</b>	4h30	4h30	5h30	5h30	4h30	4h30	5h30	5h30	3h00	3h00	3h00	3h00
<b>MP IR EXTENSION (2)</b>	<b>1h00</b>	<b>1h30</b>	<b>1h30</b>	<b>2h00</b>	<b>1h30</b>	<b>2h00</b>	<b>1h30</b>	<b>2h00</b>	<b>1h00</b>	<b>1h30</b>	<b>1h00</b>	<b>1h00</b>

(1) FTD 2/3 or above.

(2) Training for Multi-Pilot IR extension can be performed either on FTD 2/3, FFS, or the helicopter.

**8.5.5 Familiarisation training**

**AS332**

The AS332 series (*L, C, L1 & C1*) are basically equipped with conventional flight instrument panel (see page 16-Instrument panel). For those variants, familiarisation training can adequately be addressed through Self-instruction (*Rotorcraft Flight Manual*) to convert from one of those variants to another.

**AS332e**

The AS332e series (*L1e & C1e*) can also adequately be addressed through Self-instruction (*Rotorcraft Flight Manual*) to convert from one variant to the other.

The topics requiring the acquisition of additional knowledge are mentioned in the following table:

Content of theoretical subjects	Helicopter Variants / Models	Recommended Minimum Duration	Training reference manual
The following topics require the acquisition of knowledge : <ul style="list-style-type: none"> <li>• Presentation of the aircraft, structure, engine, 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> </ul>	AS332 L AS332 C AS332 L1 AS332 C1	<b>3h00</b>	RFM and Pilot Operating Handbook
	AS332 L1e AS332 C1e	<b>3h00</b>	
<ul style="list-style-type: none"> <li>• Optional equipment</li> </ul>		<b>In addition</b>	

**8.6 Training Areas of Special Emphasis (TASE).**

**8.6.1 General**

Within “Super-Puma Fleet”, each variant differs from the others in complexity and sophistication; EC225 LP and AS332e should be considered as highly automated aircraft.

Several studies have identified that automation (*its use and its limitations*) is not well understood by a part of the pilot community. This in turn can lead to situations where pilots are unable to satisfactorily control the flight path of their aircraft.

This leads to two separate but connected issues:

- a. Understanding how to use the automatics, what can go wrong with the automatics and how to cope when they do go wrong, and
- b. The need to retain the ability, when all else fails, to recover the aircraft manually.

Training, initial, additional and recurrent are the only effective mitigation for these issues. Automatics and their integration with other systems should be taught holistically, rather than treating it as a separate subject.

Training providers should ensure that pilots completing training courses for highly automated aircraft such as the EC225 LP & AS332e and to a lesser extent, the AS332L2, have a detailed operational knowledge of the automatic flight systems and have demonstrated competence in their use. The Type Rating examination question paper should test a pilot’s understanding of how the automatics affect the operation of the aircraft. Furthermore operators should have in place a programme of training that will ensure pilots are able to retain their manual flying skills.

The EC225 and AS332e have a number of subtle differences from the AS332 & AS332 L2 variants that could, if not fully understood, could prove critical during OEI operations. The following systems or procedures should receive special attention in any type rating or differences course:

- The Follow up trim system.
- Ground taxiing and issues associated with the use of the collective trim function.
- Variable Nr (EC225 LP only).
- The new Avionics system and AFCS, FADEC and issues associated with FADEC software. Reconfiguration procedures.
- The use of the Alt Acquire (Alt A) function, Altimeter pressure settings and the designation of “master side” as indicated by inverse video on the FND/NAVD.
- Cat A profiles engine failure modes and the recommendation that the GA function is used. Understanding of the GA upper mode functions in AEO and OEI operation when operating onshore and offshore.
- Understanding of the Idling-Training Mode functions and associated limitations on performance and engine indication (EC225 LP only).

In addition any TRI (H) must be well aware and familiar with the systems before any training with a candidate.

- The Flight management system (*Trimble, CMA 3000, CMA 9000 or dual CMA 9000*).
- CRM and multi crew aspects of operating in a highly automated cockpit. The use of Standard Operating Procedures (SOPs) is recommended and in a multi crew environment the allocation of responsibilities must be defined. Particular emphasis should be placed on the confirmation of the setting of autopilot upper modes.

## 8.6.2 Pilots training methodology

### • OEI training procedures

All training devices fitted on Super Puma family have to be checked before use.

- AS332 and AS332e are equipped with a removable box dedicated to training connected to the engine N° 2. As the training engine failure is performed by reducing the fuel throttle N°1, an additional flight crew member is recommended to seat on the jump seat to perform engine and NR management.

The travel of the throttle has got a stop safety system to avoid a flame out when reducing the lever for failure training. The training box protects for over limit.

- AS332 L2 & EC 225 are fitted with a fixed training mode system. Anyway, precaution must be taken by the TRI before reverting in AEO mode to avoid a possible 2 minutes OEI regime incursion. The training mode protects for N1 & Torque, but TOT must be watched carefully when using the training mode alternatively on each engine.

Demonstrations must visit at least the following exercises for clear area or runway:

- OEI in hover IGE
- OEI in rejected take off situation
- OEI with a committed take-off
- OEI on Final
- OEI with Go Around

Synthetic device shall be preferred for OEI training procedures.

- **Simulated tail rotor control failure**

Due to the collective-to-yaw-coupling on the actual helicopter, **the full exercise is better performed on FSTDs**. Plan to use the entire length of the RWY.

Landing is made easier by landing with a RH wind component (and light weight) and could be not possible with LH wind component

It is recommended to perform a shallow approach at the end; during the speed reduction close to the ground, remind to slightly push forward the cyclic during sideslip cancelation to maintain current airspeed, taking care to avoid acceleration.

For training purpose, in order to simulate the failure, it is recommended to stabilize the aircraft in level flight (IAS  $\approx$  100 Kt), and to determine the speed for which the aircraft should turn left as the consequence of collective pitch application.

Take care about the following:

- Do not flare during parallel part (h/c drops quickly out of GND effect, resulting descent can only be countered by PWR application, which makes h/c yaw to the left).
- Be always close to the ground during parallel part
- Do not induce left yaw during parallel part
- Proceed to a very progressive speed reduction.
- Do not touch down in sideslip position.

- **High wind starting procedure**

This procedure must be followed carefully as described on section 4 FLM.

As much as possible the ground GPU or APU if fitted must be used for the procedure.

Take care about the following:

- cyclic centered,
- rotor brake dynamic/static device checked,
- accumulator mini pressure & aux hydraulic pump on,
- the release of rotor brake lever.

- **Ground taxiing procedure**

Special emphasis shall be put on taxiing procedures:

- Coordinated use of cyclic and collective to avoid excessive cyclic deviation at low collective setting,
- On AS332L, L1 and AS332L1e, potential use of differential braking for left turn.

- **Electrical procedures**

All electrical procedures can be demonstrated on FSTDs.

With actual aircraft, the electric procedures are limited and shall be performed only on ground when the instruction flight is completed.

- On AS332L2 & EC 225 a specific panel, located left of jump seat position, allows simulating essential & secondary short circuit, battery temp & emergency battery.

- **Loss of AP hydraulic system**

The failure can be created in actual flight by cutting the hydraulic pressure switch on collective level. This action must be performed on TRI-H side only.

- AS332 and AS332L2 are more difficult to handle under loss of pressure as all AFCS is lost.

- AS332e & EC 225 may be demonstrated with 4 axes modes to show the SEMA supply.
- To approach on final, the upper modes shall be disengaged.

Take care about the following:

- The TRI-H must pay attention close to the ground as the increased control force may result in over-control by the pilot,
- Avoid creating this failure on ground before hovering or during take-off phase.

- **Reconfigurations procedures**

On aircraft equipped with AHCAS or IFDS, reconfigurations procedures can be demonstrated. The FSTD allows nearly all degraded situations.

In flight with actual aircraft, we can demonstrate:

- ADC discrepancies & loss of information,
- AHRS procedures & SAS degradation,
- Heading discrepancy,
- Loss of main screens or EID (EC225 or AS332e).

Take care about the following:

- The TRI must insure the aircraft is back in normal situation of flight after such exercises.
- Do not perform these demonstrations in IMC in training situation.

### 8.6.3 Demonstration methodology for Flight Instructors

- **Simulated autorotation**

The full demonstration is performed only on FSTDs.

- In order to show descent path in autorotation, the flight is stabilised at  $V_y$ , at sufficient altitude, and collective pitch is progressively decreased to the limit of de-synchronisation.
- Take a characteristic mark on ground to show autorotation angle.
- During the descent, we can let the NR increase slowly up to the aural warning, without exceeding maximum limit.
- When the NR is close to maxi do not flare & keep tight attention.
- We can perform some slight left and right turns to demonstrate the influence on the descent path, and NR value.
- Power recovery will be performed smoothly at safe altitude. Ensure NR/N2 is synchronised before rapid collective increase.
- With digital AFCS, the IAS mode can be connected to make the exercise easier to manage.
- A levelling height above the ground must be determined before exercise & selected on radio-altimeter.

## 9. Specification for Testing, Checking, Currency & Recent experience

### 9.1 Skill test & Proficiency Checks

For Single Pilot operations, as required Part-FCL.725 (c).

Where the aircraft is to be operated in the Multi pilot, IFR role, it is recommended that the skill test required by Part-FCL.725 (c) and Appendix 9 to Part-FCL is carried out.

### 9.3 Difference training courses

The candidate must satisfy additional training on the variant concerned, the completion of which is recorded on the candidate's flight log and signed by the Type Rating Instructor (TRI).

### 9.4 Specifications for Currency / recent experience

Recurrent training must be performed as specified in Part-FCL and Part-ORO.

### 9.5 Specification for Line flying under supervision

In the case of a type rating course the Operator should conduct Line Flying under supervision as required, followed by a line check on type.

## 10. Specification for Flight Simulation Training Devices (FSTDs)

FSTDs exist for all the variants/models covered by this OEB except AS332e and their use is recommended. These devices are not without their shortcomings however and most perform poorly in the simulated ground cushion. At the moment, helicopter Full flight simulators are not zero-flight time training devices and some manoeuvres are not totally representative of the helicopter. For this reason, training providers should ensure that adequate helicopter time is provided. Whilst simulation devices are invaluable tools for teaching and checking of emergencies, abnormal procedures and procedural IFR flying, certain exercises may nevertheless challenge pilots with particular discrepancies. Devices in which normal handling techniques are modified or adapted to satisfy the vagaries of the simulator technical capabilities could have a negative training value that must be acknowledged by the training provider.

Part-FCL recognises the contribution FSTDs make to the training and checking of flight crews, and in Part-FCL AMC2 FCL.725 (a), makes recommendations based on the qualification level of the device in use, citing only the use of FFS level C & D and FTD levels 2 & 3. Elsewhere, in Appendix 9 to Part-FCL, reference is made to the use of FSTDs in general and the qualification level of the device to be used. Training providers should be cognisant of this table when developing their training programmes, and seek for the advice of their NAA.

#### Note:

*Where a Full Flight Simulator (FFS) is used the device must be approved by the NAA for the Training, Checking and Recent experience proposed by the user.*

*Nowadays operators and Approved Training Organisations are in position to propose Flight Training Devices which are or will be dual qualified as both FFS level B and FTD Level 3. With the approval of the NAA any*

requirement for an FFS Level C, may be acceptable in term of training credits by a device dual qualified to FFS Level B and FTD Level 3 if such devices meet the following elements:

- *The flight test data is of a similar standard to that required for the FFS C and gathered in accordance with a NAA approved Flight Test Programme.*
- *The six-axis motion base meets requirements if there is no evidence that the reduction in motion envelope adversely affects the training or checking capabilities.*
- *The visual display is at least 150°H x 40°V continuous field of view, with day, twilight and night scene capability with sufficient scene details.*
- *Control forces and control travel which correspond to that of the replicated helicopter. Control forces shall react in the same manner as in the helicopter under the same flight conditions;*
- *Ground handling and aerodynamic programming to include ground effect, hover and transition IGE, ground reaction and ground handling characteristics.*
- *Special effects programming to include runway rumble, oleo deflections, effects of Ground-speed and uneven surface characteristics, buffet due to translational lift, turbulence and other aerodynamic effects and representative touchdown and translational lift cues*
- *All helicopter systems are accurately modelled in the normal, abnormal and emergency modes of operation.*

## 11. Application of OEB report

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

## 12. Appendices

- Appendix 0 : Cover
- Appendix 1 : EASA TCDS.N°R.002
- Appendix 2 : Part FCL-Type rating requirements
- Appendix 3 : ODR Tables
- Appendix 4 : Super Puma Fleet-Eurocopter Type Rating Training Programs summary

Notes:

Appendices are available for NAA's by request to EASA Expert department / Certification Directorate or to Eurocopter Manufacturer.