EUROPEAN AVIATION SAFETY AGENCY

CERTIFICATION FLIGHT STANDARDS

Operational Evaluation Board Report

Final Report Version 2 : 08 02 2012

Manufacturer: EUROCOPTER

DAUPHIN - Twin Engine

SA 365 N,N1, AS 365 N2, N3, N3+, & EC 155 B,B1

European Aviation Safety Agency
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SA 365 N, N1, AS 365N2

AS 365 N3, N3+

EC 155 B, B1

Revision Record

Revision No.	Section	Pages No.	Date
Final Report V1	All	All	7-12-2010
Final Report V2	All	3-5-6-10-11-21-32-34-41	8-02-2012

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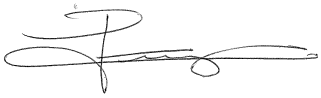

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Executive Summary

1. Manufacturer Application

Eurocopter Manufacturer has made a formal application to EASA, Certification Directorate - Flight Standards to an OEB catch up process for the evaluation of initial, additional Type Ratings and Difference courses between variants / models and in both ways for the “Dauphin -Twin Engine ” : SA 365 N,N1, AS 365 N2, N3, N3+.
In addition Eurocopter has requested to evaluate the EC 155 B & B1 in order to consider those helicopters as variants of the “Dauphin -Twin Engine”

2. OEB recommendations

The OEB recommends for approval by NAAs

- Update Type Rating List & Licence Endorsement List
- Pilot Initial Type Rating Training minimum syllabus
- Pilot Additional Type Rating Training minimum syllabus
- Difference Training minimum syllabus
- Specifications for particular emphasis during training

3. Procedures, requirements and associated AMC references

The EASA /OEB Section Rotorcraft Manager “Jean-Marc Sacazes” and DGAC / France Flight inspectors “Alexandre Antunes” and Philippe Colonge, all holding current SA 365 or AS 365 type ratings and also Eurocopter Helicopter experts have participated actively to this evaluation *(Refer to the list page 6).*

EASA was conducted this 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) 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.

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
Flight Standards Manager

Acronyms

General

AMC	Acceptable Means of Compliance
AOC	Air Operator Certificate
ASU	Ancillary System Unit
ATPL	Airline Transport Pilot Licence
ATO	Approved Training Organisation
ATR	Additional Type Rating
CPD	Common Procedures Document (for FAA-TCCA-FAA)
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
EBCAU	Engine Back-Up Control Ancillary Unit
EMB	Electrical Master Box
EPU	External Power Unit
ETS	Eurocopter Training Services
EU-OPS	EU-Commercial Air Transportation (*Aeroplane*)
ETS	Eurocopter Training Services
FADEC	Full Authority Digital Engine Control
FLI	First Limitation Instrument
FTD	Flight Training Device
FNPT	Flight and Navigation and Procedure Trainer
FSTD	Flight Simulation Training Device
FTO	Flight Training Organisation
GPU	Ground Power Unit
HIP	High Increase Power
IEM	Interpretative and Explanatory Material
IFR	Instrument Flight Rules
IR	Instrument Rating
ITR	Initial Type Rating
JAA	Joint Aviation Authorities
JAR-FCL 1	Joint Aviation Requirements Flight Crew Licensing (Aeroplane)
JAR-FCL 2	Joint Aviation Requirements Flight Crew Licensing (Helicopter)
JAR-OPS 3	Joint Aviation Requirements Operations 3 (Commercial Air Transportation) (*Helicopter*)
JOEB	Joint Operational Evaluation Board
MDR	Master Difference Requirements
MEL	Minimum Equipment List
MMEL	Master Minimum Equipment List
NAAs	National Aviation Authorities
N/A	Not Applicable
ODR	Operator Differences Requirements

OEI	One Engine Inoperative
OEB	Operational Evaluation Board
PPL (A)	Private Pilot Licence (Aeroplane)
PPL (H)	Private Pilot Licence (Helicopter)
RFM	Rotorcraft Flight Manual
SCU	System Control Unit
SEP (H)	Single Engine Piston (Helicopter)
SET (H)	Single Engine Turbine (Helicopter)
TRI	Type Rating Instructor
T/R	Tail Rotor
TRTC	Type Rating Training Course
TRTO	Type Rating Training Organisation
VEMD	Vehicle and Engine Multi-functions Display
VEMD-CAD	Vehicle & Engine Multifunction Display - Caution Advisory Display
VNE	Velocity Never Exceed
Vy	Optimum Climbing Speed

Helicopter Model designators along historic evolution within EADS group

EC : Eurocopter
AS : Aérospatiale
SA : Sud Aviation
SE : Société Nationale de Constructions Aéronautiques du Sud-Est
SO : Société Nationale de Constructions Aéronautiques du Sud-Ouest
BO : Messerschmitt-Bölkow-Blohm (MBB)
BK : MBB-Kawasaki

I. Purpose and applicability

Data is being submitted by Eurocopter in support of the catch up OEB process and the operator difference tables (ODR) provided by the manufacturer include a comparison of the SA 365 N,N1, AS 365 N2,N3,N3+," and the EC 155 B, B1.

For the purpose of the analysis and for a better understanding all those helicopters are grouped together under " Dauphin -Twin Engine Family" in this report.

The manufacturer does not request any evaluation for the former Dauphin "C" Series including : SA 365C, SA 365C1, SA 365C2 and SA 365C3. The "C" Series is regarded as a different type and is not part of this OEB. The "C" Series is excluded of the "Dauphin -Twin Engine Family" (See Chapter 7).

This report is the result of a catch up process evaluation which has been made by analysis and comparison, based on **Pilot Initial and additional Type Rating Training syllabus for** the "Dauphin - Twin Engine Family" provided by Eurocopter Training Services and FTOs' already approved by DGAC France and by other NAA's.

In addition T2 and T3 Tests have been successfully completed. Flight Inspector have flown the AS 365 N3+ and the EC 155 B1 with the Eurocopter Flight Test Pilot/ TRI-TRE.

This document:

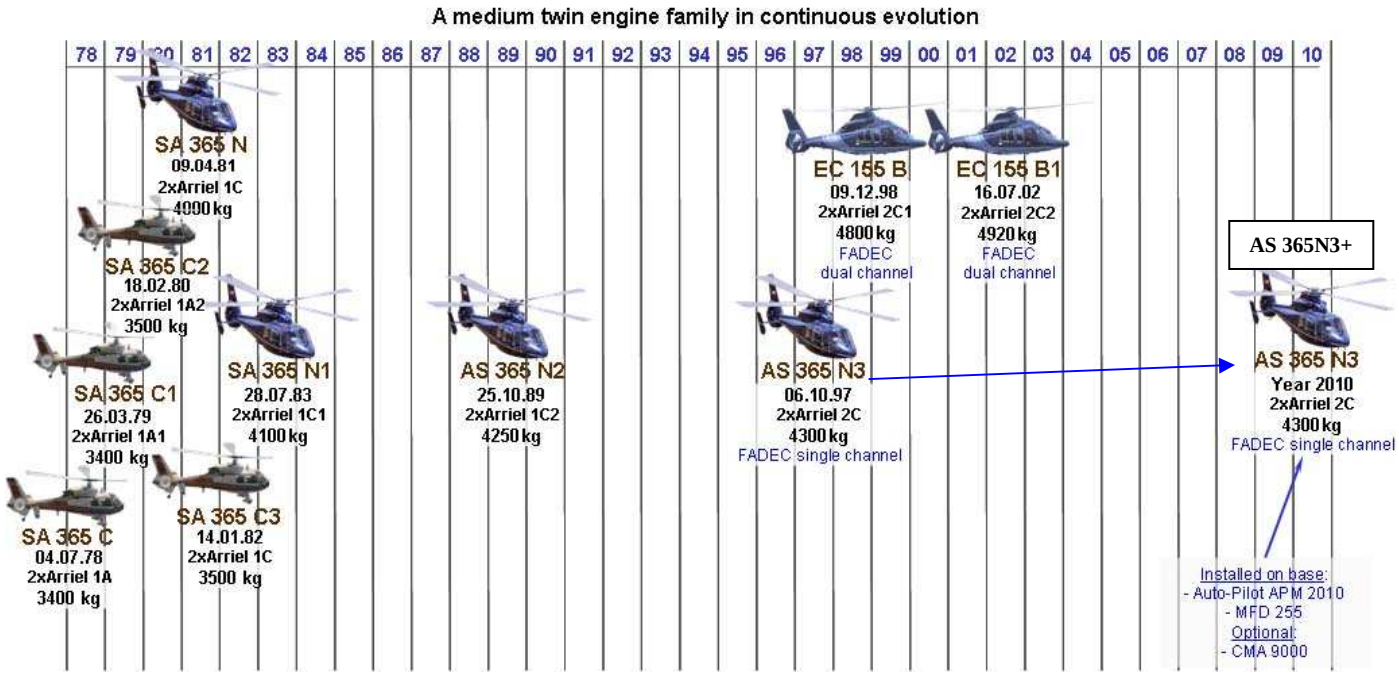
- Provides a general description of the "Dauphin -Twin Engine Family"
- Updates the Type Rating List and Licence Endorsement List including
- Makes recommendations for minimum training syllabus to:
  - initial type rating
  - additional type rating
  - differences training
  - Specifications for particular emphasis during training

Note:
SA 365 N,N1, AS 365 N2,N3 & EC 155B,B1 Helicopters are listed in the Type Certificate Data Sheet delivered by DGAC under TCDS N°159 and approved with the DGAC Type certificate N°86. (See Appendix 1).

2. General Description of Dauphin – Twin engine

EUROCOPTER Manufacturer produces the SA 365 N, N1, AS 365 N2, AS 365 N3 and EC 155 B, B1 Twin Turbine Engine Helicopters. They belongs to the "Dauphin -Twin Engine Family" and are basically approved for VFR/IFR by day and night operation

- SA 365 N, N1 and AS 365 N2 are approved in the TRANSPORT category under FAR 29 CATEGORY B, and CATEGORY A
- AS 365 N3, are approved in the TRANSPORT category under FAR 29 amendment 16 CATEGORY B and CATEGORY A
- EC 155 B,B1 is approved in the TRANSPORT category under JAR 29 first issue, CATEGORY B and CATEGORY A.



Here illustrated, the successive improvements of the "Dauphin -Twin Engine Family". The SA 365 C, C1, C2 & C3 are not evalutated in this OEB process, only the variants / models N, N1, N2, N3, and EC 155 B, B1 are regarding into this document.

All aircraft of the "Dauphin -Twin Engine Family" are medium twin engine helicopters (with 14 seats maxi on SA 365 N, N1, AS 365 N2, N3 & N3+, and 15 seats maxi on EC 155 B/B1 variants *[always including flight crew]).*
Minimum crew is one Pilot for VFR or IFR flights (*refer to relevant Rotorcraft Flight Manual*).

General

SA 365 N, N1 & AS 365 N2 :

Evolutions of the previous aircraft, the AS 365 N, N1 and N2 have the following main characteristics:

a) Engines:
- **SA 365 N**: powered by 2 Turboméca ***Arriel 1C*** (437 Kw at MCP / 492 Kw at MTOP),
- **SA 365 N1**: powered by 2 Turboméca ***Arriel 1C1*** (437 Kw at MCP / 526 Kw at MTOP),
- **AS 365 N2**: powered by 2 Turboméca ***Arriel 1C2*** (471 Kw at MCP / 550 Kw at MTOP),

b) For all, the engine governing is insured by a N2 and a N1 hydromechanical system.

c) Main Rotor Head is a *Starflex* four blades design & composite blades,

d) Tail Rotor Head is a *Fenestron* design (*0.90 m diameter for N and 1.10 m diameter for N1 & N2*), integrated in the vertical fin

e) Service ceiling: 20000 ft (6096 m) pressure altitude,

f) Maximum internal load gross weight : 4000 kg for N, 4100 kg for N1 and 4250 kg for N2,

g) Standard fuselage:11.634 m (38169 ft) / 13.684 m (44895 ft) rotor spinning,

h) Automatic Flight Control System Sfim AP 155 and Flight Coupler CDV 85 (3axes) option, or AP 155 and CDV 155 (4axes),

i) Some variants/models were equipped with EFIS 50.

Note:
SA 365 N, N1 and AS 365 N2 variants/models equipped with a hydromechanical governing system are grouped together under "AS 365 Series".

AS 365 N3 :

The **AS 365 N3** has the following main characteristics

a) Powered by 2 Turboméca ***Arriel 2C*** (581 Kw at MCP / 626 Kw at MTOP),

b) The engine governing is insured by a single channel FADEC engine governing system.

c) *Same Starflex* four blades Main Rotor Head design as N, N1, N2 aircrafts, with composite blades,

d) *Fenestron* Tail Rotor Head design, with 10 carbon fibber composite blades, unevenly distributed around the rotor hub, integrated in the vertical fin, reducing noise,

e) Identical service ceiling: 20000 ft (6096 m) pressure altitude,

f) Maximum internal load gross weight : 4300 kg (9480 lb),

g) Standard fuselage: 12.11 m (39.73 ft) / 13.73 m (45.05 ft) rotor spinning, two radar radome cowlings are fitted in function of the radar equipment; when large cowling is installed, aircraft length is 0.446 m (1.46 ft) extended.

h) Identical Automatic Flight Control System Sfim and Flight Coupler.

➢ Since 2007:

i) Primary Flight & Navigation Displays "MFD 255" is on the base version.

- Since October 2010:

Items a) to f) : **identical**,

g) Standard fuselage is 0.446 m (1.46 ft) longer, due to the large radar radome cowling installation,

h) An advanced digital Automatic Flight Control System “APM 2010”, associated with:

i) Primary Flight & Navigation Displays System “MFD255” as “2007 N3 version”.

In this configuration the AS 365 N3 is the base version considering the corresponding differences between other models. The commercial designation of this last standard is “AS 365 N3+”.

Note: The training level is induced by the IFDS concept (MFD 255 & APM 2010). A Difference course is needed to convert a Pilot from the AS 365 N3 (with & without “MFD 255”) to the AS 365 N3 equipped with the IFDS concept, and conversely

EC 155 B/B1:

The **EC 155 B/B1** has the following main characteristics:

a) Engines:
- **EC 155 B**: powered by Turboméca ***Arriel 2C1*** (581 Kw at MCP / 626 Kw at MTOP),
- **EC 155 B1**: powered by Turboméca ***Arriel 2C2*** (636Kw at MCP / 704 Kw at MTOP),

b) Both are equipped with dual channel digital engine governing system (FADEC),

c) *Spheriflex* five blades Main Rotor Head,

d) *Fenestron* Tail Rotor Head **identical to** AS 365 N3,

e) Service ceiling :
- EC 155 B =13000 ft (3965 m),
- EC 155 B1 = 15000 ft (4572 m) pressure altitude,

f) Maximum internal load gross weight :
- EC 155 B: 4800 kg (10582 lb),
- EC 155 B1: 4920 kg (10846 lb),

g) Only one fuselage version : 12.71 m (41.70 ft) / 14.30 m (46.91 ft) rotor spinning,

The Flight Display System *“Avionique Nouvelle”*, is associated with an advanced dual digital Automatic Flight Control System and Flight Management System, and a Vehicle and Engine Management Display - Caution & Advisory Display (VEMD-CAD).

Structure

The structure of the helicopters Dauphins AS 365 N2, N3 and EC 155 B1 are based on modern technology and makes wide use of: sandwich design stressed structure, NOMEX and Carbon, composite (Foam or NOMEX sandwich) glass cloth or Kevlar. It includes: the canopy and doors, the cabin, the primary structure, the tail structure, the secondary structure. The SA & AS 365 are fitted with 4 jettisonable cabin access doors (2 on each side) which open forwards , while on EC155 has 2 jettisonable cabin access doors (1 on each side) which open forwards, both received 2 jettisonable sliding doors (1 on each side) which open rearwards and 1 baggage compartment door.

Landing Gear

Each landing gear unit comprises

- A leg (oleo shock strut) that absorbs the energy upon touch-down, damp taxiing vertical accelerations and the rotor induced oscillations during starting and stopping,
- A hydraulically controlled retraction actuator.
- Retraction / Extension system:
  - LH hydraulic system ensures normal L/G retraction and extension maneuvers.
  - An emergency hydraulic system electric pump directly supplies the actuators.

Seating

The cockpit is design for one or two Pilots, for all aircrafts of this fleet.

Crew: single or dual-Pilot VFR and single or dual-Pilot IFR

Maximum seating capacity including pilot(s) seat(s):

- SA & AS 365 : 13
- EC 155 : 15

Main Rotor and blades

AS & AS 365 variants: The basic Main Rotor Head component is a STAR with four arms that are FLEXible on the flapping axis. The Star is molded, oven-cured glass/epoxy laminate construction.
The STARFLEX is secured on the main rotor mast shaft.

The principle behind the STARFLEX rotor head is to connect the rotor blades to the star arms by means of rigid beams to ensure FLAPPING, DRAG and PITCH CHANGE functions without the use of antifriction bearings.

EC 155 variants:The five blades Main Rotor Hub, without arms, integral with the main rotor mast shaft, is fitted with five laminated Spherical Thrust bearings, and five “between sleeves” Drag Damper type. This MRH evolution is called SPHERIFLEX.

Main rotor blades:

- SA & AS 365 N2 and N3 and EC 155 blades are made in composite material.
- AS 365 N2 and N3 blades are 5.275 m lengths, 385 mm to 405 mm chord and 42.3 kg weight.
- EC 155 blades are 5.611 m lengths, 385 mm to 405 mm chord and 40.2 kg weight.

Tail Rotor

The tail rotor is a Fenestron type for the entire Dauphin fleet.

This type of T/R is integrated inside a tunnel, which is designed to overcome the loss in efficiency in reduced airflow associated with standard tail rotor design. This small turbine optimises the thrust, whilst simustaneously reducing the T/R size.

- SA 365 N has a 13 blades T/R with a diameter of 0.90 m (*2.95 ft*).
- SA 365 N1 and AS 365 N2 have a 11 blades T/R with a diameter of 1.10 m (*3.61 ft*).
- AS 365 N3 and EC 155 B/B1 have the “Silent Fenestron”: an asymetrical spaced 10 blades T/R reducing noise level, with a diameter of 1.10 m (*3.61 ft*).

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Drive System

The drive train system provides a means of transmitting power from the engines to the main and tail rotor assemblies. Power from the engines is tranmitted to the rotors through the MGB after rotational speed reduction. TheMGB drives the tail transmission shaft and also the accessory equipment such as hydraulic pumps and optionals.

The Main Gear Box:

The MGB is designed as a Main Casing on which are installed two Input Casings (*for the Engine-to-MGB couplings),* on the LH and RH sides, and, on the top, the Rotor Shaft Casing, on which are secured the four suspension bars. An elastic suspension is mounted between the MGB bottom and the structure:

- The Engines transmits to MGB the torque through the two “Engine power inputs”,
- The MGB transmits the power to the Main Rotor and the Tail Rotor transmission shaft,
- The MGB drives also the MGB oil pump, the hydraulic pumps and the front fan (*oil coolers*), and optional equipments.

Tail Rotor Drive Shaft (*SA/AS 365 Series, N3 and EC 155 B1*)

This transmission consist of three shafts: forward, enter and rear shafts. Center and rear shafts are supported by five bearings (*ball bearings*) rotating in an rubber visco-elastic damper. The bearings are lubricated periodically

The forward shaft is coupled to the center shaft by a flexible coupling. The center and rear shafts are assembled with bolts. The forward and rear shafts splined ends fit into the MGB and TGB coupling flanges.

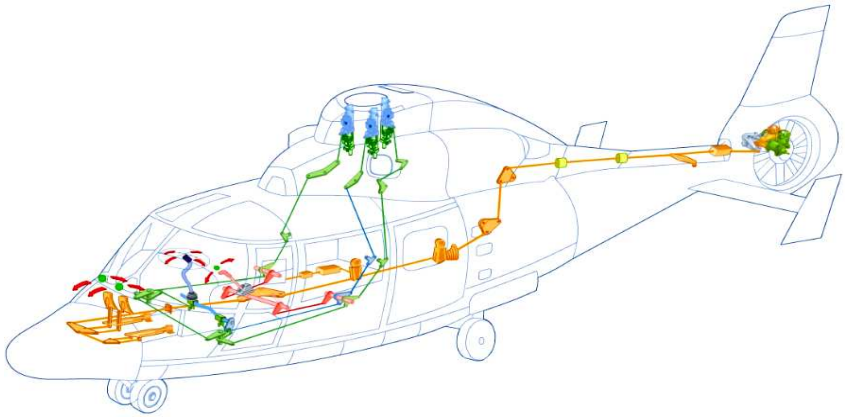
Tail Gear Box (*SA/AS 365 Series, N3 and EC 155 B1*)

The Tail Gear Box is installed at the end of the tail boom, in the Fenestron tunnel. It insures the following functions

- Tail Rotor drive (*90° angle drive*),
- Splash lubrication,
- Reduction gearbox (*Input speed for all the fleet: 4010 rpm*)

Flight controls

The control linkage connecting the cyclic stick, the collective lever and the Swashplate consist of rigid link rods (*installed below the cockpit/cabin floor, inside the "9" frame and on the mechanical deck)* functionally interconnected by bellcranks and relays. On the EC 155 variants, the rods end relays inside the "9" frame are replaced by ball type fle xible controls



Each control channel drives the Swashplate through a hydraulic servo control that provides the required actuating force. The mixing units constitute the interface between the cyclic and collective pitch controls.

Rotor Brake

The rotor brake control handle is installed on the cabin ceiling panel. As soon as the control handle is moved, the indicator light comes on. The rotor brake control is equipped with a safety electrical system. Starting is only possible when rotor brake control lever is release, engaged in the front notch, light off, illustrated on the following draw

Engines

Installed rearward of the MGB, the engines are modular design, allowing individual module SA 365 N, N1 and AS 365 N2 are equipped with *Arriel* 1 engines [*Dual stage gas generator turbine*]:

- AS 365 N: *Arriel 1C* (437 Kw at MCP / 492 Kw at MTOP),
- AS 365 N1: *Arriel 1C1* (437 Kw at MCP / 526 Kw at MTOP),
- AS 365 N2: *Arriel 1C2* (471 Kw at MCP / 551 Kw at MTOP),
- AS 365 N3 is equipped with *Arriel* 2C [*Single stage gas generator turbine with monocrystal blades*]:
- EC 155 B is equipped with *Arriel* 2C1 and
- EC 155 B1 with *Arriel* 2C2

Ignition system

On AS & SA 365 N/N2 variants, depressing the starting pushbutton located on the fuel flow lever, Pilot energized starting relay: starting solenoid valve opens and the ignition unit produce sparks. At the same time the starter-generator drives the gas generator. From here, the starting cycle develops on its own. When the gas generator rpm arrives at 40 % the engine is under its own power and the Pilot should release the pushbutton. The starting solenoid valve closes automatically at the end of starting, due to P2 air pressure action.

On AS 365 N3 variants, each engine is fitted with a digital control unit that ensures automatic starting. Engine control selector set to “AUTO”, starting selector set to “FLT”, and the DECU initiates automatically the starting sequence. When N1 is at + or – 45 %, the engine is self-sustained and the starting system cuts-off. The DECU then handles the control and accelerates the engine up to its rated speed. This is the normal setting in flight.

On EC 155 B/B1 variants, like on N3 variants, each engine is fitted with a digital control unit that ensures automatic starting. The digital control unit monitors also the entire starting sequence.
Manual starting is not possible.When starting selector is set to “IDLE” position, the digital unit automatically brings the engine to ground idle rating (67 % N1). When the selector is set to “FLIGHT” position, the digital unit automatically brings the engine to normal flight power rating.

Fuel system

SA 365 N/N2/N3: The five bladder-type fuel cells are made from rubber-coated polyester. These fuel tanks are installed beneath the cabin and baggage hold floors so that the centre of gravity of the fuel is located under the theoretical aircraft centre of gravity. The lower structure which receives these tanks is perfectly leak tight since they form part of the aircraft floatation reserve in conjunction with the floats of the emergency floatation reserve gear installation.

The engine feed systems are separate; group 1 supplies engine 1 (LH) and group 2 supplies engine 2 (RH). There is one feeder “feeder tank” for each fuel tank group. The two booster pumps which supply each engine draw fuel from the feeder tanks. As long as there is still some fuel in the other tanks, the feeder tanks remain full, supplied by the action of the jet pumps.. Fuel can be transferred from one group to the other; a transfer pump makes it possible.

For the EC155 B/B1: A bladder-type fuel cells number 6 is added

Electrical system

DC Electrical generation:

Dauphin AS365N, N1/N2,N3:
For each version the supply of the instruments and installations is made thanks to:

- Two generators-starters G1 & G2 (one by engine) when the engine are working,
- A 28 V DC battery is used to start the engines and to proceed to all the different electrical tests, engines off.

EC155 B/B1) General:

- 2 Starters-generators G1 & G2 (one per engine),
- 1 Main Battery
- 1 Electrical Battery Master Box (BMB)
- 2 Generators Electrical Master Box (EMB1 & EMB2)

AC Electrical generation:

AC power supply system consists of two static inverters, each generating 115V/400hz and 26/400 hz

The static inverters supply the aircraft AC power systems on the ground and in flight from the aircraft DC system (self contained or via DC power receptacle).

Under normal working conditions, each inverter supplies one of the networks through a change-over switch. Should one of the inverters fail, the associated switch makes it possible to supply the faulty circuit by means of the remaining inverter. Each group of distribution bus bars receives 115 V and 26 V power from its associated static inverter.

There is no alternative current (AC) system on the EC155 family. Equipment requiring AC current get they internal static inventor. An optional AC system could be installed. This comprise the AC ground connector, one or two AC alternators and regulating system.

Hydraulic system

The hydraulics system of the AS365 N1, N2 and N3 and EC 155B/B1 are both composed of two sub-systems which are completely independent.

The Left Hand system is composed of:

- One reservoir of 8 liters (or 6.5 liters for the EC 155B/B1)
- A self regulating pump
- Some monitoring components (pressure switch 85/110 bar and pressure transmitter), filters check valves are present in order to protect the circuit
- The auxiliary system pressure is regulated with a landing gear unit.
- A landing gear unit permits also to control the landing gear (extension/retraction)

The Right Hand system is composed of:

- One reservoir of 5.5 liters (3.5 liters used)
- A constant flow rate pump with a single stage
- Some monitoring components (pressure switch 85/110 bar and pressure transmitter), filters check valves are present in order to protect the circuit
- A tail servo-control cut-off manifold permitting to isolate the tail actuator in case of leakage

The main differences between the SA & AS365 family and the EC155 are:

- pressure, 60 bar for AS 365 and 140 for EC155
- pressure regulation, constant flow rate pump with a regulating unit on AS365 and self regulating pump on EC155

Instrument panel and console

EC 155 B & B1

Current version AS 365 N3

Former AS 365 N3 and AS 365 N,N1, N2

On EC155 B/B1, the Vehicle and Engine Multifunction Display (**VEMD**) presents Engine and Vehicle parameters

The VEMD front panel has 2 screens and 10 pushbuttons arranged in 4 groups.

- **"OFF1 / OFF2" group**

The "OFF1" and "OFF2" buttons (1) ensure the same function, i.e. de-energize their respective screen and associated processing module. They are also used to re-energize the VEMD.

- **"BRT+ / BRT-" group**

These two buttons (5) are used to vary continuously and simultaneously the brightness of the 2 screens.

- **"SCROLL / RESET" group**

The "SCROLL" button (2) is used to step through the screen pages.
The "RESET" button (3) is used to return the central display system to its nominal configuration.

- **"SELECT / ENTER" group**

This group (4) is used to select, modify and validate a data field.

LIGHTING:

The VEMD has two lighting systems, i.e. one for the screens and one for the pushbuttons. The screen lighting system is controlled by a signal from the "Day/Night" lighting ancillary PCBs which commands two brightness levels, and by the "BRT+ /BRT-" buttons which adjust the brightness around the "Day" and "Night" levels.

The Caution & Advisory Display (**CAD**) replace the conventional Caution & Warning Panel:

The front panel of the CAD has 1 screen and 5 pushbuttons arranged in 3 groups.

- **"OFF" control**

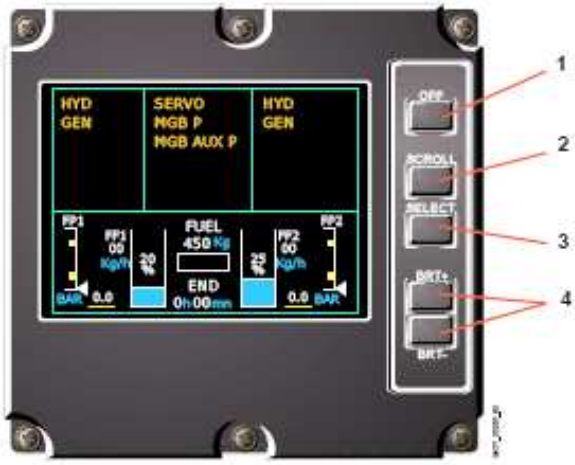
The "OFF" button (1) is used to de-energize the CAD.The VEMD allows for this power cut-off. The normal CAD page is then displayed on the bottom screen of the VEMD.

- **"SCROLL / SELECT" group**

The "SCROLL" button (2) is used to step through the different caution pages.
The "SELECT" button (3) is used to acknowledge the cautions.

- **"BRT+ / BRT-" group:**

These two buttons (4) are used to vary continuously and simultaneously the brightness of the screen.



LIGHTING:

The CAD lighting principle is the same as for the VEMD.

3. Helicopters main characteristics:

3.1 General

Technical differences between variants SA 365 N,N1, AS 365 N2,N3,N3+ & EC155B,B1 helicopters

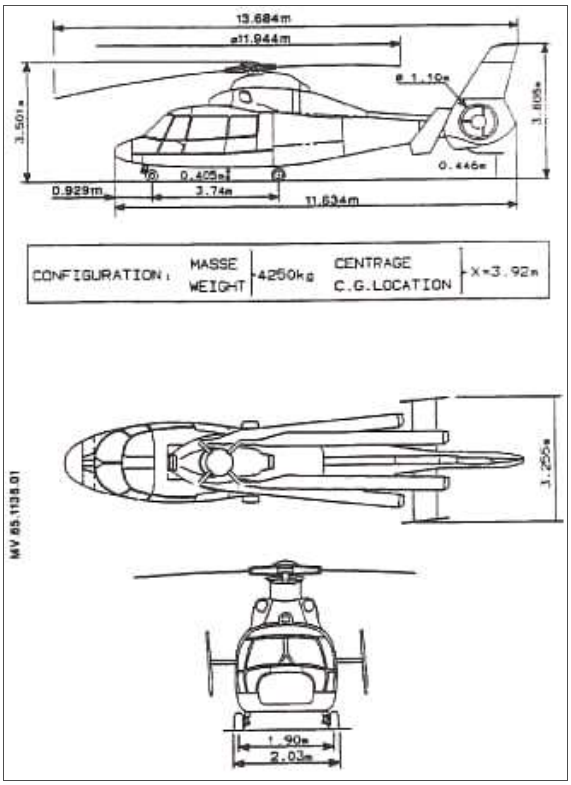
→			SA 365 N	SA 365 N1	AS 365 N2	AS 365 N3	AS 365 N 3+	EC 155 B	EC 155 B1
Dimensions	Fuselage	Length	11.44 m (*37.53 ft*)	11.63 m (*38.17 ft*)	identical	identical	identical	12.71 m (*41.70 ft*)	identical
		Width	2.03 m (*6.66 ft*)	2.03 m (*6.66 ft*)	identical	identical	identical	identical	identical
		Height	4.01 m (*13.16 ft*)	3.80 m (*12.49 ft*)	identical	identical	identical	4.35 m (*14.27 ft*)	identical
	Main rotor	Diameter	11.94 m (*39.17 ft*)	11.94 m (*39.19 ft*)	identical	identical	identical	12.60 m (*41.34 ft*)	identical
	Tail rotor		0.90 m (*2.95 ft*)	1.10 m (*3.61 ft*)	identical	identical	identical	identical	identical
Engines			TWO Arriel 1C	TWO Arriel 1C1	TWO Arriel 1C2	TWO Arriel 2C	identical	TWO Arriel 2C1	TWO Arriel 2C2
Fuel tanks			1158 l (in 2 groups of fuel cells)	identical	identical	identical	identical	1273 l (in 2 groups of fuel cells)	identical
Air Speed	Power ON	Absolute VNE	175 kt (*324 km/h*)	identical	identical	identical	identical	identical	identical
	Power OFF		135 kt (*250 km/h*)	identical	identical	identical	identical	identical	identical
Rotor Speed	Power ON		350 rpm + 15 / -10 rpm	350 rpm + / -10 rpm	identical	345 to 360 rpm	identical	342 to 350 rpm	identical
	Autorotation		320 to 395 rpm	identical	identical	identical	identical	316 to 375 rpm	identical
Maximum Operating		Pressure Altitude	20000 ft	identical	identical	identical	identical	13000 ft	15000 ft
MTOW with Internal load			4000 kg	4100 kg	4250 kg	4300 kg	identical	4800 kg	4920 kg
MTOW with External load			4000 kg	4100 kg	4250 kg	identical	identical	4800 kg	4920 kg
Category A	Density Altitude	Clear Heliport	15000 ft	15000 ft	14500 ft	13000 ft	Identical	7250 ft	7250 ft
		VTOL operations	8000 ft	10500 ft	5400 ft	5000 ft	Identical	2000 ft	5000 ft

(Reading mode/ : column by column from left to right)

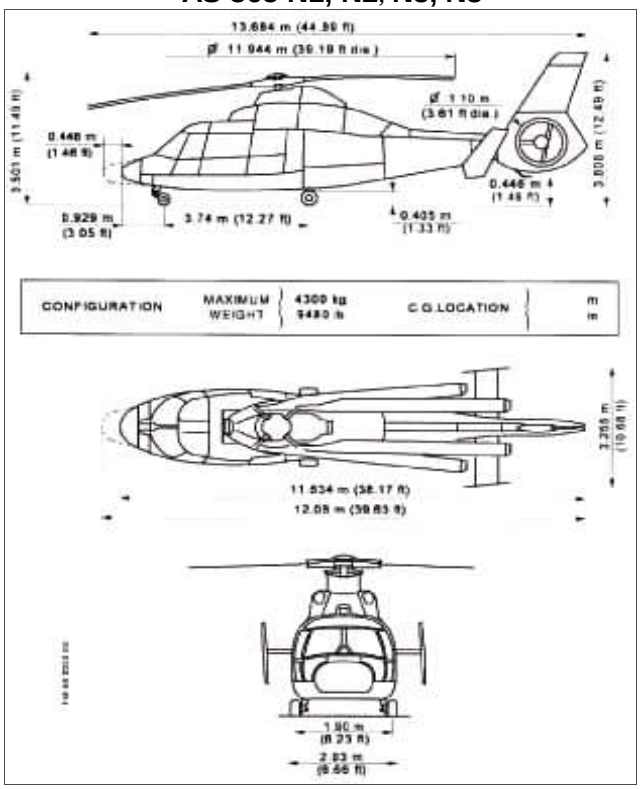
Note :
AS 365 N3+ = AS 365 N3 equipped with MFD 255 & APM 2010

3.2 Exterior Dimensions

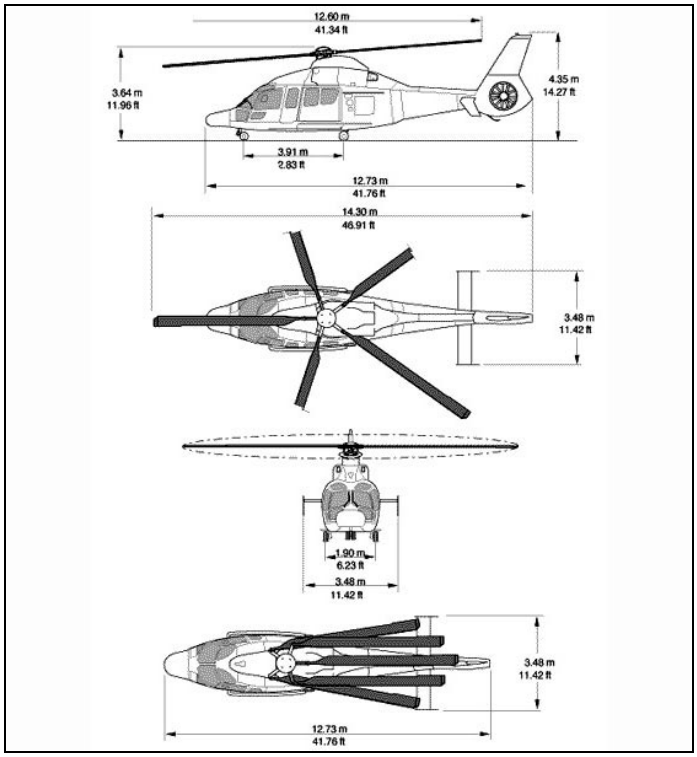
AS 365 N



AS 365 N1, N2, N3, N3+



EC 155 B, B1



4. Operator Difference Requirement (ODR) Tables

Operator Difference Requirements are those operator specific requirements necessary to address differences between a base aircraft and one or more variants, when operating in mixed fleet flying, or when seeking credit in transition programs.

ODRs include both a description of differences and a corresponding list of Training, Checking and Currency compliance methods which address pertinent OEB and regulatory requirements.

Even the AS 365 N3 is the Dauphin family reference aircraft, for the purpose of the analysis and for a better understanding, each aircraft is also used as a reference Helicopter for the concerned following ODR tables, this to identify the differences between one aircraft and the other.

Note:
Considering the slight differences between:

- *the EC 155 B and B1 , only familiarization training through self instruction is needed to convert from one to the other. That is why the EC 155 B1 variant only is presented in the ODR Tables.*

- *the SA 365 N, SA 365 N1 and AS 365 N2, only familiarization training is needed to convert from one of these aircraft to another. That is why the AS 365 N2 variant only is presented in the ODR comparison Tables.*

5. Optional specific equipment

Optional specific equipment tables have been produced also by Eurocopter *(See Appendix 4).*

6. Master Differences Requirements (MDR) Tables

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.

The Master Differences Requirement (MDR) table identifies the most restrictive of the ODR training, checking and currency requirements. It provides a high-level overview of the minimum acceptable methods of satisfying the training, checking and currency requirements as defined by the OEB.

The methods and guidelines presented in this document are not the only acceptable methods for ensuring compliance with the appropriate regulatory sections. Operators may use other methods if those methods are shown to provide the necessary level of safety and are acceptable to the regulatory authority.

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

Difference Level Table

DIFFERENCE LEVEL	TRAINING	CHECKING	RECENT EXPERIENCE / CURRENCY
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)

AT LEVEL E – NEW TYPE RATING IS NORMALLY ASSIGNED
* = IOE/SLF/LIFUS/line indoc MAY BE REQUIRED ACCORDING TO REGULATIONS
PC = PROFICIENCY CHECK
**FFS or aircraft may be used to accomplish specific manoeuvres

This CPD has been established basically for fixed wing evaluations, so it appears that adaptations to comply with JAR-FCL2 regulation and specific elements dedicated to helicopter are necessary. Numbers of regulatory items OPS / FCL and operational aspects concern typically helicopter matters like:

- At least one hour flying time for Multi Engine difference training
- No Helicopter class Rating
- Limited number of Flight Simulation Training Device (FSTD's) is available

6.2. Training, Checking, and Recurrent Training difference requirements

From helicopter →		SA 365 N	SA 365 N 1	AS 365 N 2	AS 365 N3	AS 365 N3+	EC 155 B	EC 155 B1
To helicopter	SA 365N		A/A/A	B/B/B	D/D/D	D/D/D	D/D/D	D/D/D
	SA 365N 1	A/A/A		B/B/B	D/D/D	D/D/D	D/D/D	D/D/D
	AS 365N 2	B/B/B	B/B/B		D/D/D	D/D/D	D/D/D	D/D/D
	AS 365N3	D/D/D	D/D/D	D/D/D		D/D/D	D/D/D	D/D/D
	AS 365N3+	D/D/D	D/D/D	D/D/D	D/D/D		D/D/D	D/D/D
	EC 155B	D/D/D	D/D/D	D/D/D	D/D/D	D/D/D		A/A/A
	EC 155B1	D/D/D	D/D/D	D/D/D	D/D/D	D/D/D	A/A/A	

Operator Difference Requirement tables have been produced by Eurocopter to evaluated the all Dauphin Twin –engine family regarding Pilot Initial, additional Training course and difference training in between all variants / models *(See Appendix 3).*
T2 and T3 Test have been performed to evaluate the general handling qualities, flight controls differences between SA 365 N,N1, AS 365 N2, N3, N3+ and EC 155 B,B1.

OEB has concluded that the Master Differences Requirements are at levels A/A/A to D/D/D**.**

The Operational Evaluation team has considered the SA 365 N,N1, AS 365 N2, N3, N3+ and EC 155 B & B1 and recommends to classify EC 155 B / B1 as " a variant" in the "Dauphin Twin Engine Family"**.**
The Dauphin "C" Series including : SA 365C, SA 365C1, SA 365C2 and SA 365C3 is regarded as a different type. (See paragraph 7).

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
Eurocopter			
-ME Turbine -	SA 365 N SA 365 N1 AS 365 N2	(D)	S 365 / EC 155
	AS 365 N3		
	AS 365 N3+		
	EC155 B/B1		

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 (Helicopters)

1 Manufacturer	2 Helicopter	3	4 Licence endorsement
Eurocopter			
-ME Turbine -	SA 365 C SA 365 C1 SA 365 C2 SA 365 C3		SA 365 C
	SA 365 N SA 365 N1 AS 365 N2	(D)	S 365 / EC 155
	AS 365 N3		
	AS 365 N3+		
	EC155 B/B1		

8. Specification for Training

8.1 General

The type Rating Training courses and Skill Test proposed by Eurocopter for the SA 365 N,N1 & AS 365 N2,N3,N3+, & EC 155B,B1, fulfill the minimum requirements of Appendix 1 to JAR-FCL 2.261(b). (See Appendix 2).

The assessment is based on the Pilot Initial and Additional Type Rating Training syllabus proposed by EurocopterTraining Services approved by DGAC France and to other approved training Syllabus from other European FTOs already approved by their national Authority.

The OEB reviewed the courses 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 a diverse pilot background, knowledge, culture and experience and which are both adaptable and flexible in the training provision.

All ETS courses follow a similar construction and publish:

- Prerequisites for entry onto the specific course
- Theoretical ground program and test(s)
- Helicopter flight training program in both, helicopter and Flight Simulation Training Device
- Skill test(s) when applicable

The OEB recommends the Initial and additional 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:

8.2 Course pre-entry requirements

All students must fulfil the requirements of JAR=FCL 2.255 for an initial multi-engine, single or multi-pilot helicopter-training course.

8.3 Licensing requirements

All students must fulfil the requirements of JAR–FCL 2.261 Type ratings – Knowledge and flight instruction and of Appendix 1 to JAR-FCL 2.261(b) Flight Instruction and Skill Test

The amount of flight instruction will depend on:

- complexity of the helicopter type, handling caracteristics, level of technology
- previous experience of the applicant
- the level of qualified FSTDs.

8.4 Initial, Additional Type Rating & Difference training courses

The following training courses are considered and are consistent with those provided by ETS:

8.4.1 Initial Type Rating (ITR)

Candidates for the Initial SA/AS 365 series, AS 350 N3, N3+, and EC 155 B/B1 ME-SP Type Rating must:

- Hold a valid Helicopter Pilot license,
- Hold a Single-Engine Piston / Turbine Pilot Type Rating
- Comply with the requirements set out in JAR-FCL 2.261 and 2.262.
- Have 70 Flight Hours as PIC
- Hold a Multi Engines Turbine pre-entry course (ref. Appendix 1 JAR FCL 2.255).

- ITR 1 as regards to AS 365 series : N, N1, N2
- ITR 2 as regards to AS 365 N3
- ITR 3 as regards to AS 365 N3+
- ITR 4 as regards to EC 155 B/B1

8.4.2 Additional Type Rating (ATR)

Candidates for an Additional SA/AS 365 series, AS 350 N3,N3+ or EC 155 B/B1 ME-SP Type Rating must:

- Hold a valid Pilot license,
- Hold a Multi-Engine Turbine Pilot Type Rating
- Comply with the requirements set out in JAR-FCL 2.261 and 2.262.

- ATR 1 as regards to AS 365 series : N, N1, N2
- ATR 2 as regards to AS 365 N3
- ATR 3 as regards to AS 365 N3+
- ATR 4 as regards to EC 155 B/B1

8.4.3 Difference training courses in between variants (D)

Candidates for a Differences Training (D) must:

- Hold a valid Dauphin variant rating with a view to extending it to another Dauphin variant (set out in JAR-FCL 2.220).

Training on differences between :

D1 :	AS 365 series and AS 365 N3	D7 :	AS 365 N3+ and EC 155 B/B1
D2 :	AS 365 series and AS 365 N3+	D8 :	AS 365 N3+ and AS 365 N3
D3 :	AS 365 series and EC 155 B/B1	D9 :	AS 365 N3+ and AS 336 series
D4 :	AS 365 N3 and AS 365 N3+	D10 :	EC 155 B/B1and AS 365 N3+
D5 :	AS 365 N3 and EC 155 B/B1	D11 :	EC 155 B/B1and AS 365 N3
D6 :	AS 365 N3 and AS 365 series	D12 :	EC 155 B/B1and AS 365 series

Differences Table :

From ⟶		AS 365 series	AS 365 N3	AS 365 N3+	EC 155 B/B1
Difference n° 1	To:	**AS 365 N3**			
Difference n° 2	To:	**AS 365 N3+**			
Difference n° 3	To:	**EC 155 B/B1**			
Difference n°4	To:		**AS 365 N3+**		
Difference n° 5	To:		**EC 155 B/B1**		
Difference n° 6	To:		**AS 365 series**		
Difference n° 7	To:			**EC 155 B/B1**	
Difference n n°8	To:			**AS 365 N3**	
Difference n° 9	To:			**AS 365 series**	
Difference n°10	To:				**AS 365 N3+**
Difference n°11	To:				**AS 365 N3**
Difference n°12	To:				**AS 365 series**

8.5 Initial, Additional Type rating & Difference Theoretical knowledge syllabus and test summary

Theoretical instruction should be provided in accordance with Appendix 1 to JAR-FCL 2.261 (a).
This matrix present the material for an Initial, Additional Type rating & Difference Theoretical knowledge syllabus and test summary. Whilst based on the Eurocopter programs, Training providers should ensure their type specific courses cover the pertinent material.

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 for both Initial and Additional type rating training. 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.

For a Difference Training, the examination is not required but recommended and used as an understanding check.

The tables below summarise the minimum theoretical training hours required for VFR:

Theoretical Training Program	Training on AS 365 Series (N, N1,N2)					Training on AS 365 N3					Training on AS 365 N3+					Training on EC 155 B/B1				
	ITR 1	ATR 1	D 6	D 9	D 12	ITR 2	ATR 2	D 1	D 8	D 11	ITR 3	ATR 3	D 2	D 4	D 10	ITR 4	ATR 4	D 3	D 5	D 7
Aircraft, structure, transmissions, rotors and equipment, normal and abnormal systems operations	32h00	32h00	7h00	7h00	10h00	34h00	34h00	7h00	2h00	10h00	32h00	32h00	7h00	2h00	10h00	32h00	32h00	12h00	12h00	12h00
Limitations	2h00	2h00	1h00	1h00	1h00	2h00	2h00	1h00	1h00	1h00	2h00	2h00	1h00	1h00	1h00	2h00	2h00	1h00	1h00	1h00
Performance, preparation and flight controls	3h00	3h00	2h00	2h00	2h00	3h00	3h00	2h00		2h00	3h00	3h00	2h00		2h00	3h00	3h00	2h00	2h00	2h00
Weight and balance, operation	2h00	2h00	1h00	1h00	1h00	2h00	2h00	1h00		1h00	2h00	2h00	1h00		1h00	2h00	2h00	1h00	1h00	1h00
Emergency procedures	4h00	4h00	1h00	1h00	2h00	4h00	4h00	1h00	1h00	2h00	4h00	4h00	2h00	2h00	2h00	4h00	4h00	2h00	2h00	2h00
Special conditions required for helicopters equipped with electronic flight instrument system (EFIS), Digital AFCS and/or VEMD						5h00	5h00	5h00		5h00	11h00	11h00	11h00	6h00	5h00	11h00	11h00	11h00	6h00	5h00
Optional equipment	In addition					In addition					In addition					In addition				
TOTAL TRAINING	43h00	43h00	12h00	12h00	16h00	50h00	50h00	17h00	4h00	21h00	54h00	54h00	24h00	11h00	21h00	54h00	54h00	29h00	24h00	23h00
THEORETICAL EXAM	3h00	3h00	1h00	1h00	1h00	3h00	3h00	1h00		1h00	3h00	3h00	1h00		1h00	3h00	3h00	1h00	1h00	1h00
TOTAL TRAINING + EXAM	46h00	46h00	13h00	13h00	17h00	53h00	53h00	18h00	4h00	22h00	57h00	57h00	25h00	11h00	22h00	57h00	57h00	30h00	25h00	24h00

8.6 Flight training course summary (VFR and IR Extension)

The following section presents a summary of the material a Flight Training Syllabus for Type rating and difference training courses should consider. Whilst based on manufacturer programme, training providers should ensure their type specific courses cover the pertinent material. The following exercises may be carried out in an appropriately qualified FSTD and for a part in the helicopter.

Approved training organisation will manage duration and sufficient numbers of flight necessary to cover the flight training syllabus content.

Night training is required under operating rules where a pilot is not instrument rated and where operations will be undertaken. However for an initial type rating on one of these variants, SA 365 N,N1 & AS 365 N2,N3,N3+ & EC 155B,B1 the OEB strongly recommended to incorporate in the training programme a navigation flight by night.

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.

8.6.1 Initial Type Rating (ITR)

For : AS 365 Series'(N,N1,N2) , AS 365 N3 & N3+, EC 155 B/B1			
	FFS & Helicopter	**FTD & Helicopter**	**Helicopter only**
Familiarization: Pre-flight, cockpit, engine start, Shut down, Basic air work, General Handling	**1h30**	**1h30**	**1h15**
Various Circuits and touch-downs.	**1h30**	**1h30**	**1h15**
Systems Integration and Display, Navigation, FMS, System Malfunction, Emergency procedures. Hydraulic failure, Manual Control of engine power, Straight in Autorotation	**1h30**	**1h30**	**1h30**
CAT B. Abnormal and Emergency Procedures. Engine failures. Simulated Engine failure, Hydraulic failure, Manual Control of engine power	**1h30**	**1h30**	**1h15**
Clear Area CAT A take-off and landing AEO and OEI training procedures at different V1 and MTOM.	**1h30**	**1h30**	**1h15**
CAT A take-off and landing AEO and OEI training procedures, Clear Area, Confined Area, Helipad.	**1h30**	**1h30***	**1h15**
Navigation Flight by day or night / Flight management system, avionics, AFCS	**1h30**	**1h30***	**1h45**
Consolidation Session: Pre-flight, cockpit, engine start, Basic air work, General Handling, All CAT A take-off and landing profiles, AEO and OEI training procedures and reviewing of emergency procedures (as applicable)	**2h00***	**2h00***	
Total VFR Flight Training	**12h30**	**12h30**	**9h30**
Skill Test (*In accordance with Appendix 3 of FCL 2.240.)*	**Required**		
IR Extension Flight Training	**4h00 + 2h00***	**5h00 + 2h00***	**6h00**
Total IR Extension Flight Training	**6h00**	**7h00**	**6h00**
Skill Test (*In accordance with Appendix 3 of FCL 2.240.)*	**Required**		

Note:
In both tables ITR and ATR , hours highlightled and assigned with an asterix, means that those hours are in the aircraft

8.6.2 Additional Type Rating (ATR)

For :	AS 365 Serie's			AS 365 N3 & N3+			EC 155 B/B1		
	FFS & Helicopter	FTD & Helicopter	Helicopter only	FFS & Helicopter	FTD & Helicopter	Helicopter only	FFS & Helicopter	FTD & Helicopter	Helicopter only
Familiarization: Pre-flight, cockpit, engine start, Shut down, Basic air work, General Handling	1h30	1h30	1h15	1h30	1h30	1h15	1h30	1h30	1h15
Various Circuits and touch-downs.	-	-	-	-	-	-			-
Systems Integration and Display, Navigation, FMS, System Malfunction, Emergency procedures. Hydraulic failure, Manual Control of engine power, Straight in Autorotation	1h30	1h30	1h15	1h30	2h00	1h15	1h30	1h30	1h15
CAT B. Abnormal and Emergency Procedures. Engine failures. Simulated Engine failure, Hydraulic failure, Manual Control of engine power	1h30	1h30	1h15	1h30	1h30	1h15	1h30	1h30	1h15
Clear Area CAT A take-off and landing AEO and OEI training procedures at different V1 and MTOM.	-	-	-	-	-	-	-	-	-
CAT A take-off and landing AEO and OEI training procedures, Clear Area, Confined Area, Helipad.	1h30	1h30*	1h15	1h15	1h15*	1h15	1h30	1h30*	1h15
Navigation Flight by day or night / Flight management system, avionics, AFCS	-	-	1h15	-	-	1h15	-	-	1h15
Consolidation Session: Pre-flight, cockpit, engine start, Basic air work, General Handling, All CAT A take-off and landing profiles, AEO and OEI training procedures and reviewing of emergency procedures (as applicable)	1h15*	1h30*	-	1h15*	1h15*	-	1h30*	1h30*	
Total VFR Flight Training	7h15	7h30	6h15	7h00	7H30	6h15	7h30	7h30	6h15
Skill Test (*In accordance with Appendix 3 of FCL 2.240.*)	Required								
IR Extension Flight Training	2h00 + 1h30*	2h00 + 1h30*	3h00	2h00 + 1h30*	2h00 + 1h30*	3h00	2h00 + 1h30*	2h00 + 1h30*	3h00
Total IR Extension Flight Training	3h30	3h30	3h00	3h30	3h30	3h00	3h30	3h30	3h00
Skill Test (*In accordance with Appendix 3 of FCL 2.240.*)	Required								

8.6.3 Difference Training

To AS 365 N *series*	D6 (N3 to N series)					D9 (N3+ to N series)					D12 (155B/ B1 to N series)				
	FFS & Helicopter		FTD & Helicopter		Flight	FFS & Helicopter		FTD & Helicopter		Flight	FFS & Helicopter		FTD & Helicopter		Flight
Systems & Engines	1H30		1H30		1H30	1H30		1H30		1H30	1H30		1H30		1H30
Procedures (OEI) CAT A	1H30		1H30		1H30	1H30		1H30		1H30	1H30		1H30		1H30
Navigation 1 VFR/IFR/Night															
Navigation 2 IR Ext	2H00		2H00		2H00	2H00		2H00		2H00	2H00		2H00		2H00
Consolidation VFR Flight 1		1H30		1H30	1H30		1H30		1H30	1H30		1H30		1H30	1H30
VFR FLIGHT TRAINING	3H00	1H30	3H00	1H30	1H30	3H00	1H30	3H00	1H30	1H30	3H00	1H30	3H00	1H30	1H30
TOTAL VFR FLIGHT TRAINING	4H30		4H30		4H30	4H30		4H30		4H30	4H30		4H30		4H30
IR EXTENSION TRAINING	2H00		2H00		2H00	2H00		2H00		2H00	2H00		2H00		2H00

Table 1

To AS 365 N3	D1 (N series to N3)					D 8 (N3+ to N3)					D11 (155 B/B1 to N3)				
	FFS & Helicopter		FTD & Helicopter		Heli. Only	FFS & Helicopter		FTD & Helicopter		Flight	FFS & Helicopter		FTD & Helicopter		Flight
Systems & Engines						1H30		1H30		1H30	1H30		1H30		1H30
Procedures (OEI) CAT A	1H30		1H30		1H30						1H30		1H30		1H30
Navigation 1 VFR/IFR/Night	1H30*1		1H30*1		1H30*1										
Navigation 2 IR Ext	2H00		2H00		2H00	2H00		2H00		2H00	2H00		2H00		2H00
Consolidation VFR Flight 1		1H30		1H30	1H30		1H30		1H30	1H30		1H30		1H30	1H30
VFR FLIGHT TRAINING	1H30	1H30	1H30	1H30	3H00	1H30	1H30	1H30	1H30	3H00	3H00	1H30	3H00	1H30	4H30
TOTAL VFR FLIGHT TRAINING	3H00*2		3H00*2		3H00*2	3H00		3H00		3H00	4H30		4H30		4H30
IR EXTENSION TRAINING	2H00		2H00		2H00	2H00		2H00		2H00	2H00		2H00		2H00

Table 2

*Note: (*1) = 1h30 : when N3 is equipped with MFD 255*
*(*2) = 4h30 instead of 3h00 when N3 is equipped with MFD 255*

To AS 365 N3+	D2 (N series to N3+)					D 4 (N3 to N3+)					D10 (155 B/B1 to N3+)				
	FFS & Helicopter		FTD & Helicopter		Flight	FFS & Helicopter		FTD & Helicopter		Flight	FFS & Helicopter		FTD & Helicopter		Flight
Systems & Engines	1H30		1H30		1H30	1H30		1H30		1H30					
Procedures (OEI) CAT A	1H30		1H30		1H30						1H30		1H30		1H30
Navigation 1 VFR/IFR/Night															
Navigation 2 IR Ext	2H00		2H00		2H00	2H00		2H00		2H00					
Consolidation VFR Flight 1		1H30		1H30	1H30		1H30		1H30	1H30		1H30		1H30	1H30
VFR Flight training	3H00	1H30	3H00	1H30	4H30	1H30	1H30	1H30	1H30	3H00	1H30	1H30	1H30	1H30	3H00
TOTAL VFR Flight training	4H30		4H30		4H30	3H00		3H00		3H00	3H00		3H00		3H00
IR Extension training	2H00		2H00		2H00	2H00		2H00		2H00	2H00		2H00		2H00

Table 3

To EC 155 B/B1	D3 (N series to 155 B/B1)					D5 (N3 to 155 B/B1)					D7 (N3+ to 155 B/B1)				
	FFS & Helicopter		FTD & Helicopter		Flight	FFS & Helicopter		FTD & Helicopter		Flight	FFS & Helicopter		FTD & Helicopter		Flight
Systems & Engines	1H30		1H30		1H30	1H30		1H30		1H30					
Procedures (OEI) CAT A	1H30		1H30		1H30	1H30		1H30		1H30	1H30		1H30		1H30
Navigation 1 VFR/IFR/Night															
Navigation 2 IR Ext	2H00		2H00		2H00	2H00		2H00		2H00					
Consolidation VFR Flight 1		1H30		1H30	1H30		1H30		1H30	1H30		1H30		1H30	1H30
VFR Flight training	3H00	1H30	3H00	1H30	4H30	3H00	1H30	3H00	1H30	4H30	1H30	1H30	1H30	1H30	3H00
TOTAL VFR Flight training	4H30		4H30		4H30	4H30		4H30		4H30	3H00		3H00		3H00
IR Extension training	2H00		2H00		2H00	2H00		2H00		2H00	2H00		2H00		2H00

Table 4

8.7 Familiarisation training

8.7.1 Acquisition of additional knowledge.

. AS 365 Series

The AS 365 series (SA 365 N,N1 and AS 365 N2) are basically equipped with conventional flight instruments panel (see page 19-Instrument and Console panel). For those aircraft familiarisation training can adequately be adressed through Self-instruction (*Rotorcraft Flight Manual*) to convert from one of these aircraft to another.

. EC 155 B & B1

Familiarisation training for the EC 155 B and B1 can also adequately be adressed through Self-instruction (*Rotorcraft Flight Manual*) to convert from one of these aircraft to another.

The topics requiring the acquisition of additional knowlege are mentionned in the following table:

<table>
<tr><th>Content of theoretical subjects</th><th>Helicopter Variants / Models</th><th>Recommanded Minimum Duration</th><th>Training reference manual</th></tr>
<tr><td rowspan="2">The following topics require the acquisition of knowledge :
• Presentation of the aircraft, structure, engine, transmission, rotors and equipment, normal and contingency operation of the systems
• Limitations
• Performance, preparation and flight control
• Weight and balance, operation</td><td>SA 365N
SA 365N1
AS 365N2</td><td>3h00</td><td rowspan="3">RFM and Pilot Operating Handbook</td></tr>
<tr><td>EC 155 B
EC 155B1</td><td>3H00</td></tr>
<tr><td>• Optional equipment</td><td></td><td>In addition</td></tr>
</table>

8.7.2 Variants equipped with instruments panel including EFIS or MFD options

AS 365 series (N,N1,N2) and AS 365 N3
Because aircraft are constantly evolving, latest versions are equipped with EFIS or MFD. Options in retrofits allow AS 365 series (N,N1,N2) and AS 365 N3 variants to be fitted with such avionics.

From a basic variant / model of the AS 365 series (N,N1,N2) and AS 365 N3 equipped with conventional flight instruments panel, to another variant equipped with EFIS or MFD, pilots need a familiarisation training through aided instruction.

Systems training Devices	Variants / Models Instrument panel equipment	Recommanded Minimum Duration	Training reference manual
Cockpit trainer, computer based trainer, FSTD's	EFIS or MFD Training extension	**4H00**	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.

8.8 Specifications for particular emphasis during training

The following procedures for training should receive special attention. Since, although they relate to separate issues, they are inter-connected. Flight Instructors and Type Rating Instructors should take into account across the whole “Dauphin -Twin Engine Family” , that Pilot Training methodology and demonstration methodology are linked.

Therefore the OEB supports the manufacturer recommendations and training providers should consider these elements.

8.8.1 Pilot Training new concept and methodology

The Dauphin -Twin Engine, Family comprise SA/AS 365 series, AS 350 N3, N3+, or EC 155 B/B1 variants/models. The aircraft each differ mainly in automation

This in turn can lead to situations where pilots are unable to satisfactory control the flight path of their aircraft. New concepts on how managing the aircraft require from pilots, understanding how to use automatics, what can go wrong with the automatics and how to cope when they do go wrong. Also the need to retain the ability, when all else fails, to recover the aircraft manually.

The new FADEC and issues associated with FADEC software, advanced digital Automatic Flight Control System “APM 2010”, associated with Primary Flight & Navigation Displays System “MFD 255” should receive special attention in any type rating or differences courses.

8.8.2 Demonstration methodology for Flight Instructors and Type Rating Instructors:

- **One Engine Inoperative (OEI) training procedures**

AS 365 Serie’s (N, N1, N2) : On these aircrafts, a flow limiter tool is necessary to perform OEI training.This device enables OEI procedures to be practiced without exceeding damaging limitations for transmission and remaining engine.

The SUP.56 in the FLM describes how to use the flow limiter tool and prepare the OEI training.

Introduction to the use of the flow limiter tool is indispensable, before training flights

Even with the training device installed, it is always possible to push fuel flow control levers fully forward in case of doubt on exercise success.

To give a comprehensive description of aborted take-off, it is advisable to demonstrate 3 different steps:
- Simulated engine failure when aircraft tilt from hover to nose down attitude.
- Simulated engine failure when IAS ≈ 30 Kt.
- Simulated engine failure when IAS ≈ 60 Kt.

Take care about the following:

Should it be necessary to immediately shut down the engine on which the training device is installed, the fuel shut-off cock lever must be used

It is mandatory to check aircraft performances before any Flight Training.
It is advisable to let the undercarriage down when performing drill circuits.

AS 365 N3 & EC 155: These aircrafts are equipped with a training system which enables OEI procedures to be practiced using non-damaging power levels, with aircraft weights reduced accordingly.
OEI training shall be prepared in accordance with the SUP.56 in the FLM.

Introduction how to use the training mode is necessary before training flights

To give a comprehensive description of aborted take-off, it is advisable to demonstrate 3 different steps:
- Simulated engine failure when aircraft tilt from hover to nose down attitude.
- Simulated engine failure when IAS ≈ 30 Kt.
- Simulated engine failure when IAS ≈ 60 Kt.

Take care about the following:

It is mandatory to check aircraft performances before starting Flight Training

Apply the post-starting checklist describe in paragraph 4.1, SUP.56, before every Training Flight.

The procedure describe in paragraph 4.2, SUP.56, must be followed for each use of OEI training switch.

Reverting the “training mode” switch from “Idle” (1 or 2) to “Flight” position with the power set above the continuous training rating may result in using actual OEI 2min rating, so reduce the power before.

The Training Mode has not been designed to go beyond the limits.

- **Simulated tail rotor control failure**

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

When airspeed is lower than 45 Kt, go-around is impossible due to loss of vertical fin efficiency

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 first to stabilize aircraft in level flight (IAS ≈ 100 Kt), and to determine the speed for which the aircraft should turn left as the consequence of collective pitch application.

Due to the heading hold function of AP, it is recommended to disengage the both yaw channels, pulling up the two push buttons on the SFIM155, and switch off the “COLL.LINK” function (AS365N/N3).
On AS365N3+ and EC155, it is necessary to engage the SAS mode.

Take care about the following:

Do not flare during parallel phase (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 phase
Do not induce left yaw during parallel phase
Proceed to a very progressive speed reduction.
Do not touch down in sideslip position, especially when landing on smooth grass landing area.

- **FADEC failure *(AS365N3)***

The training system enables to simulate a major engine governing failure.
For this:
- The metering valve is frozen at the flow rate which existed at the time of simulated failure.
- The actual 30 sec OEI ratings are automatically armed.

Actuation of both AUTO/MANU switches together is forbidden.

In case of any emergency, or doubt on exercise success, return the AUTO/MANU switch on AUTO.

To make the approach easier, reduce the Ng of the engine with the failed governor by 5% approximately, with emergency throttle lever. In final approach, readjust the Ng of the engine with the failed governor by 5% approximately with emergency throttle lever.

Before simulating the major engine governing failure, it is mandatory, on ground, to turn the FAU selector on “FAULT” position. If “RESOL” message appears, OEI training is forbidden. This procedure must be followed for each use of AUTO/MANU switch.

For training purpose, it is advisable to favor a manual governing decreasing the fuel flow, rather then increasing the fuel flow.

Take care about the following:

Ng must not be stabilized at a value < 62%

Torque must not be stabilized at a value < 5%

There is a risk of disconnecting the emergency throttle lever governor, if the emergency throttle lever is advanced too quickly. In order to re-engage it, position the emergency throttle lever in the neutral notch for 2 sec, and then push it forwards more slowly.

In case of engine failure, there is no automatic setting of OEI 30 sec rating.

Even if 30sec OEI rating is disarmed, incursion into the real OEI rating is not protected.

- **Simulated autorotation**

The autorotation is only demonstrated with power off and never with engines at idle.

In order to show descent path in autorotation, the flight is stabilised at Vy, at sufficient altitude, and collective pitch is progressively decreased to the limit of desynchronization.

Take a characteristic mark on ground to show autorotation angle.

During the descent, we can let the NR increasing slowly up to the aural warning, without exceeding maximum limit.

We can perform some slight left and right turns to demonstrate the influence on the descent path, and NR rating.

Power recovery will be performed smoothly at safe altitude.*

- **Lighting « LIMIT » light under load factor *(AS365N3)***

Calculate first the VNE Power On according the AUW, HP and OAT.

Accelerate close to the calculated VNE Power On, with a sufficient torque margin to avoid an over torque during the pull up.

Perform a slight left turn and a not abrupt pull up to increase the load factor up to generate the LIMIT light and Gong.

Do not maintain these flight conditions after the LIMIT + Gong.

- **Manuel starting procedure *(AS365N3)***

The engine requiring Manual mode start should be started second.

Do not attempt engine starting with Ng > 15%.

The Manual start shall be performed in strict compliance with the operating mode described in Chapter 4, Section 4.8 of FLM.

Flight is only authorised if no failure warnings subsists after selecting the AUTO/MANU switch to AUTO (engine from manual mode to automatic mode).

In order to avoid some trainee's mistake, It is advisable to control the throttle manoeuvre with him.

9. Specification for Testing & Checking & Recent Experience

9.1 Skill test

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

9.2 Proficiency Checks

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

9. 3 Recent experience

Applicants must meet the requirements of JAR-OPS 3 (AMC OPS 3.980-Operation on more than one type or variant).

10. Specification for Flight Simulation Training Devices

When this report has been finalized either Flight Simulator or Flight Training devices have been qualified in accordance with JAR-FSTD (H) and compliant with EASA requirements.

Most of the courses considered incorporated the use of Flight Simulation Training Device. The OEB considers that devices are essential to any conversion or type rating course.

11. Application of OEB 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.008
- Appendix 2 : JAR-FCL2 Type rating requirements
- Appendix 3: ODR and MDR Tables

Notes:
Appendices are available for NAA's by request to EASA / Certification Directorate- Expert Department or to Eurocopter Manufacturer.