EUROPEAN AVIATION SAFETY AGENCY

EXPERT DEPARTMENT / CERTIFICATION DIRECTORATE

Operational Evaluation Board Report

Final Report – Revision 1 : 29 05 2013

Manufacturer: AgustaWestland

A109E, A109S & AW109SP

European Aviation Safety Agency
Postfach 10 12 53
D-50452 Köln, Germany

A109E

A109S

AW109SP

Revision Record

Revision No.	Section	Pages No.	Date
Final Report V1	All	All	19-07-11
Final Report Rev 1	All	All	29-05-13

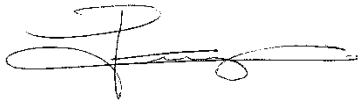
Contents

- Cover 1
- Aircraft Pictures 2
- Revision Record 3
- Contents 4
- Operation Evaluation Board – OPS-FCL 5
- AgustaWestland experts involved in the process 6
- Executive Summary 8
- Abbreviations / Acronyms 9

1. Purpose and applicability 10
2. General Description of A109E, A109S & AW109SP 11
3. Aircrafts 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 Simulator Training Devices (FSTD's) 33
11. Application of OEB report 33
12. Appendices 33

Operational Evaluation Board – OPS / FCL Subgroup

Jean-Marc SACAZES
EASA – Section Manager
Operational Suitability Rotorcraft / Balloons / Airships
Experts department- Certification Directorate



AgustaWestland Experts and NAA's involved in the original Report (19-07-11)

Name	Position	Office / Branch	Remarks
Luigi SIMONCINI	Helicopter Flight Inspector	ENAC - ITALY	
Gianluigi GINO	Head of Airworthiness Office	DOA	Focal Point
Giovanni M. Puricelli	Airworthiness Engineer	DOA - Airworthiness	Focal Point
Davide Franchi	Airworthiness Engineer	DOA - Airworthiness	-
Stefano Biagini	Accountable Manager	AW Training Academy	-
Leonardo MECCA	Head of Training	AW Training Academy	-
Filippo DI SILVESTRO	Quality Manager	AW Training Academy	-
Alessandro CELLA	Chief Ground Instructor	AW Training Academy	-
Damiano BARDELLA	Project Engineer	DOA - CPE Office	-

AgustaWestland Experts involved in this Revision 1 Report (08-05-13)

Name	Position	Office / Branch	Remarks
Gianluigi GINO	Head of Airworthiness Office	DOA	Focal Point
Giovanni M. Puricelli	Airworthiness Engineer	DOA - Airworthiness	Focal Point
Leonardo MECCA	Head of Training	AW Training Academy	-
Alessandro CELLA	Quality Manager	AW Training Academy	-

Executive Summary

1. Manufacturer Application

In February 2011, AgustaWestland has made a formal application to EASA, Certification Directorate - to an OEB catch up process for the evaluation of the A109E, A109S & AW109SP, helicopter Pilot Type Rating Training syllabus, and for A109S & AW109SP compliance check List with JAR-OPS 3 Subpart K & L.

In January 2013 EASA Certification Directorate received another application from AgustaWestland to review the previous OEB report and to evaluate new training courses with the integration of FSTD's.

This "Report Revision 1 "supersedes the original report called "Final Report V1 "(19-07-2011).

2. OEB recommendations

This report Revision 1, is based on the initial report and the OEB recommends for approval by NAAs:

- Update Type Rating List:
- Pilot Initial Type Rating Training minimum syllabus (ITR)
- Additional type rating minimum syllabus (ATR)
- Differences Training minimum syllabus between A109E, A109S & AW109SP
- Instrument Rating (IR) Extension
- Currency & Recent experience requirements
- The standard offered for A109S & AW109SP which is in compliance with JAR-OPS 3 Subpart K& L . (See Appendix 4 and 5).

3. Procedures, requirements and associated AMC references

During the initial catch up, EASA /OEB Section Rotorcraft Manager "Jean-Marc Sacazes" and ENAC-Italy Helicopter Flight Inspector "Luigi Simoncini" qualified on numbers of the A109 variant and AgustaWestland experts have participated actively to this evaluation (Refer to the list page 6).

At that time EASA 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.

For this "Report Revision 1 " 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.
EASA and AgustaWestland experts have participated actively to this evaluation. (Refer to page 7).

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

Abbreviations / Acronyms

AC	Alternating Current
AMC	Acceptable Means of Compliance
ATR	Additional Type Rating
CBT	Computer Based Trainer
CPD	Common Procedure Document
DAU	Data Acquisition Unit
DC	Direct Current (electrical)
EASA	European Aviation Safety Agency
EDU	Electronic Display Unit
ENAC	Ente Nazionale Aviazione Civile
FADEC	Full Authority Digital Engine Control
FFS	Full Flight Simulator
FSTD	Flight Simulation Training Device
FTO	Flight Training Organisation
GA/TU	Go Around / Transition Up
IEM	Interpretative and Explanatory Material
IFR	Instrument Flight Rules
IR	Instrument Rating
ITR	Initial Type Rating
JAA	Joint Aviation Authorities
JAR-FCL 2	Joint Aviation Requirements Flight Crew Licensing (Helicopter)
JAR-OPS 3	Joint Aviation Requirements Operations 3 (Commercial Air Transportation) (H)
JAR-FSTD	Joint Aviation Requirements -Flight Simulation Training Device
JOEB	Joint Operational Evaluation Board
MDR	Master Difference Requirements
MET-H	Multi Engine Turbine (Helicopter)
MTOM	Maximum Take Off Mass
NAA	National Aviation Authority
N/A	Not Applicable
ODR	Operator Differences Requirements
OEI	One Engine Inoperative
OEB	Operational Evaluation Board
OPS	Flight Operations
OTD	Other Training Device
PIC	Pilot in Command
RFM	Rotorcraft Flight Manual
RPM	Revolution Per Minute
TRI	Type Rating Instructor
TRTC	Type Rating Training Course
TRTO	Type Rating Training Organisation
VFR	Visual Flight Rules
VNE	Velocity Never Exceed
VTOL	Vertical Take Off & Landing

I. Purpose and applicability

Data is being submitted by AgustaWestland in support of the catch up OEB process concerning differences between the helicopters A109E, A109S & AW109SP. The operator difference tables (ODR) provided by the manufacturer include a comparison between the three aircrafts.

The initial report was the result of this catch up process evaluation which has been made by analysis and comparison, based on **Pilot Initial Type Rating Training syllabus for the A109E, A109S & AW109SP** provided by the TRTO of AgustaWestland Training Academy already approved by ENAC-ITALY, and Pilot Initial Type Rating Training syllabus approved by other NAA. The OEB Flight Inspector has also flown on AW109SP with an AgustaWestland TRI.

In addition, the evaluation of the A109S & AW109SP helicopters have also shown that the standard offered by both are in compliance with JAR-OPS 3 Subparts K & L.
However the A109S & AW109SP do not comply with the additional requirements for helicopters operating to or from helidecks located in a hostile sea area as defined in JAR-OPS 3, and it is not certified for amphibious operation. (See Appendix 4 and 5).

In this "Report Revision 1 " the manufacturer provided new Training courses where FSTD's have been integrated for the different variants.

Note:
For those helicopters the OEB recommends, depending on helicopter configuration, if physical separation between cockpit and passenger cabin is existing an additional fire extinguisher should be installed into the passenger cabin (See AMC OPS 3.790 -Hand Fire Extinguishers).

This document:

- Provides a general description of the A109E, A109S & AW109SP helicopters
- Updates the Type Rating List and Licence Endorsement List
- Makes recommendations for minimum Training Syllabus for the A109E, A109S & AW109SP to:

  - Pilot Initial Type Rating Training minimum syllabus (ITR)
  - Additional type rating minimum syllabus (ATR)
  - Differences Training minimum syllabus between A109E, A109S & AW109SP
  - Instrument Rating (IR) Extension
  - Currency & Recent experience requirements
  - The standard offered for A109S & AW109SP which is in compliance with JAR-OPS 3 Subpart K& L . (See Appendix 4 and 5).

Note:
A109E, A109S & AW109SP are listed in the Type Certificate Data Sheet delivered by EASA under Type Certificate Data Sheet EASA TCDS.R.005 (See Appendix 1)

2. General Description of A109E, A109S & AW109SP

General

A109E, A109S & AW109SP are light Twin Engine helicopters (MET-H), with 8 seats (pilot included). High-speed, high performance, multipurpose helicopters powered by two engine Turbines, and fitted with:

– four-bladed, fully articulated main rotor
– a low drag titanium and composite main rotor head with elastomeric bearings
– a two-bladed tail rotor
– a retractable tricycle-type landing gear
– a fuselage forward section and an aft section (tail boom).

Airframe

The airframe consists of two major assemblies: the fuselage and the tail boom.
The fuselage comprises the forward fuselage, the center fuselage and the aft fuselage.
The forward fuselage includes a nose bay for the installation of electric and avionics equipment and a bottom bay that accommodates the nose landing gear, the hydraulic accumulators and other hydraulic components. The forward fuselage also includes the cockpit. A hinged door on each side of the forward fuselage provides access to the cockpit.
The center fuselage includes the passenger compartment (cabin), the fuel tank bay, the main landing gear bays. A sliding door is located on each side of the center fuselage for access to the passenger compartment.
The A109S & AW109SP are named commercially " Grand and Grand New" both aircraft received a new platform wider and longer compare to the A109E named "Power".
The AW109SP received new hybrid metal composite fuselage structure

Landing Gear

The helicopter is equipped with tricycle retractable landing gear. The landing gear permits take-off, landing, taxiing and towing from prepared and semi prepared surfaces with a maximum gross weight of 2850 Kg for the A109E and 3175 kg for A109S & AW109SP.

Cabin / Seating

The cabin includes the crew compartment (cockpit) and the passenger compartment. Seating is provided for the pilot (right side) and a passenger or an additional pilot in the cockpit. The passenger compartment is generally rigged to carry six passengers in two three-seater benches. Other configurations can be arranged for mission specific requirements.

Main Rotor

The main rotor system includes the main rotor blades, the main rotor head, the rotating controls, the main rotor indicating system.

The main rotor blades are of composite material.
Each blade consists of:
– A fiberglass spar
– A trailing edge made of a graphite-fiber skin and a Nomex core
– A stainless steel abrasion strip attached to the leading edge
– A fiberglass tip cap with a nickel anti-abrasive strip.
The blades are statically balanced during construction by means of weights fitted to the blade end and trailing edge. The blade retention bolts are hollow and allow the addition of weights during hub balancing. A trim tab is bonded to the trailing edge to permit rotor tracking.

The Main Rotor Head (MRH) consists of the hub, levers, grips, dampers, flapping and droop restrain mechanisms and elastomeric bearings.

Tail Rotor

The tail rotor system includes: the tail rotor hub, the tail rotor blades and the pitch mechanism.
The hub and blade assembly comprises an internally splined trunnion installed on the 90-degree gearbox output shaft, a hub mounted on the trunnion, two blades linked to the hub with two tension-torsion straps and two retaining bolts.
The tail rotor blades are made of composite material. The A109E could also be fitted with tail rotor metallic blades

Servo Control System

The servo control system comprises the main rotor servo-actuators and the tail rotor servo-actuator. The servo-actuators are powered from the flight controls hydraulic system.

Drive System

The drive system transmits engine power to the Main Rotor and to the Tail Rotor drive shaft.
The main transmission is mounted on the cabin upper deck forward of the two engines.
The main transmission reduces the speed of 6000 RPM from the main drive shafts to a speed of 380 RPM (100% NR) in the main rotor mast, with three stages of RPM reduction:
– The first stage of reduction includes two freewheels and associated input gear shafts which drive two symmetrical idler gears, and one gear installed on the external splines of a main input pinion.
– The second stage of reduction includes a pinion which drives a bevel gear shaft.
– The third stage of reduction includes a planetary gear train. The planetary gear train drives in turn the main rotor mast installed in the internal splines of the hub of the planetary gear-train
The tail rotor drive system transmits power from a drive on the main transmission to the tail rotor through three drive shafts and the 90-degree gearbox. The tail rotor drive system includes: the tail rotor drive shafts and the 90-degree gearbox.
The tail rotor has three drive shafts (Number 1 drive shaft, Number 2 drive shaft and Number 3 drive shaft).
The Number 1 drive shaft transmits the torque from the main gearbox to the Number 2 drive shaft. The Number 2 and Number 3 drive shafts transmits the torque to the 90-degree gearbox.
The 90-degree gearbox provides a 90° change in the direction of drive and 2.8 to 1 speed reduction between the input shaft and the output shaft on which the tail rotor is mounted.
The 90-degree gearbox consists mainly of the case assembly, input pinion assembly and output shaft assembly.
The 90-degree gearbox is attached to the structure through a mounting sleeve.

Flight controls

The rotor flight control system gives positive control of attitude, speed and altitude of the helicopter.
The system includes: the main rotor control system, the tail rotor control system, the servo control system.

The main rotor control system controls the helicopter in pitch and roll, climb and descent.
The main rotor control system includes: the collective control system, the cyclic control system, the magnetic-brake artificial-feel and trim units, the stabilization actuators, the mixing control system.
The collective control system is a conventional rigid control tube type, and is controlled by the pilot and copilot through the collective control levers installed on the left side of the pilot's and copilot's seats.
The cyclic control system is a conventional rigid control tube type and is controlled by the pilot's and copilot's through the cyclic control sticks. The system transmits the control movements to the mixing group.
The mixing control system is a conventional rigid type and comprises a mixing group, control tubes.
The mixing group is installed on the upper deck of the helicopter. It receives the movements from the cyclic and collective control systems and transmits them to actuate the servo-actuators.

The tail rotor control system controls the direction (yaw axis) of the helicopter. The tail rotor control system is controlled by two sets of adjustable tail rotor pedals that are connected by a series of levers, push-pull tubes and bellcranks to the tail rotor hydraulic servo-actuator. The system incorporates a control tube provided with a stabilization actuator and magnetic brake artificial feel unit

Rotor brake

The rotor brake system is used to stop the rotation of the rotor during engine power-off. The rotor brake system includes hydraulically operated caliper acting on a disc secured to the tail rotor drive pinion.
Hydraulic fluid supplied from the utility hydraulic system operates the caliper. The brake is applied by actuating the control lever located on the overhead console. The control lever is connected to the nose wheel centering lock and the brake selector valve by means of a metal cable.

Engines

The engine installation consists of the two free-turbines, turboshaft engine incorporating a single stage centrifugal compressor driven by a single stage turbine.

- The A109E can be equipped with either Pratt & Whitney PW206C or Turbomeca Arrius 2K1 engines.
- The A109S & AW109SP are equipped with Pratt & Whitney PW207C

Those engines are controlled by a Full Authority Digital Engine Control (FADEC) system. Each engine consists of two main modules:

- MODULE 01 : Reduction gearbox
- MODULE 02 : Gas generator and power turbine

Fuel system

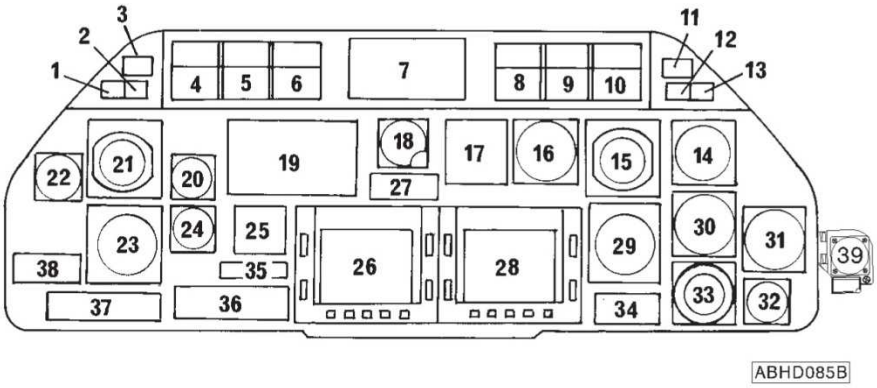
This system has the primary function to store and deliver fuel to the engines. The fuel system includes: the storage system, the distribution system, the indicating system.

The fuel storage installation has two main bottom tanks and one main top tank. The tanks are refuelled via a filler cap on the right side of the main top tank. Each main bottom tank supplies fuel to its associated engine (right tank to the No 2 engine, left tank to the No 1 engine).
The bottom tanks are gravity-fed from the top tank.
The main tanks are of the bladder type and made of rubberized fabric.
Each tank compartment is sealed to prevent fuel from leaking into other parts of the helicopter in the event of leaks. All fuel tank compartments have drain and venting holes.

The distribution system allows the flow of fuel from the booster pumps to the fuel pump and filter group of each engine. The distribution system consists of two independent circuits each of which supplies the associated engine. When activated, a cross-feed valve allows the fuel from one circuit to supply both engines.
A fuel control panel, located on the interseat console provides the primary interface between the pilots and the fuel system. The panel controls the booster pumps, the shut-off valves and the cross-feed valve

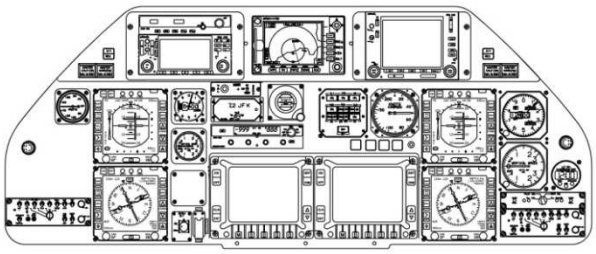
Instrument panel and console

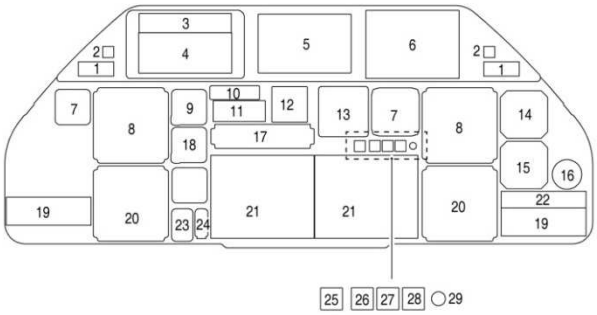
- **A109E** standard flight instrument panel and console include:



1. MASTER CAUTION lighted push-button
2. MASTER WARNING lighted push-button
3. Marker Beacon indicator
4. A.D.F. control panel
5. NAV2 control panel (VOR2)
6. NAV1 control panel (VOR1)
7. Empty
8. Transponder control panel
9. VHF/AM2 control panel
10. VHF/AM1 control panel
11. Marker Beacon indicator
12. MASTER CAUTION lighted push--button
13. MASTER WARNING lighted push--button
14. Altimeter, encoder
15. Attitude Director Indicator
16. Airspeed indicator
17. Flight Director mode selector
18. Attitude Director Indicator, stand-by
19. Empty
20. Altimeter
21. Attitude Director Indicator
22. Airspeed indicator
23. E.H.S.I.
24. Instantaneous vertical speed (I.V.S.I.)
25. Empty
26. E.C.U.2
27. D.M.E. indicator
28. E.C.U.1
29. E.H.S.I.
30. Instantaneous vertical speed (I.V.S.I.)
31. Radio altimeter indicator
32. Clock
33. Horizontal Situation Indicator
34. Empty
35. Marker Beacon control panel
36. Intercommunication control panel
37. E.H.S.I. control panel
38. Empty
39. Magnetic compass

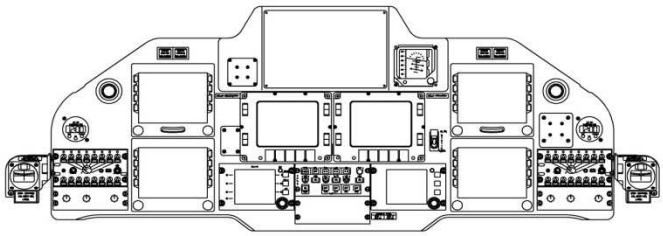
- **A109S** standard flight instrument panel and console include:

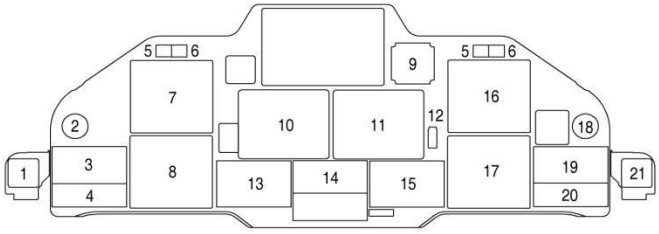




Ref	Description
1	Master caution and master warning lights
2	VG1/VG2 selection push-button switch
3	ADF receiver
4	COMM/NAV/GPS unit
5	Moving map display (optional)
6	COMM/NAV/GPS unit
7	Airspeed indicator
8	Electronic Attitude Director Indicator (EADI)
9	Altimeter
10	Marker Beacon (MB) control panel
11	Distance Measuring Equipment (DME) control panel and indicator
12	Standby attitude indicator
13	Flight Director (FD) control panel
14	Encoder altimeter
15	Vertical velocity indicator
16	Digital chronometer
17	Air Traffic Control Transponder (ATC XPDR) control panel
18	Vertical velocity indicator
19	Audio control panel
20	Electronic Horizontal Situation Indicator (EHSI)
21	Electronic Display Unit (EDU)
22	Intercommunication control panel
23	Emergency Localizer Transmitter (ELT) switch
24	Alternate static port switch
25	COMM 1 GUARD lighted push-button switch
26	COMM 2 GUARD lighted push-button switch
27	FD lighted push-button switch
28	DME lighted push-button switch
29	DME test push-button switch

- **AW109SP** standard flight instrument panel and console include:





Ref	Description
1	Copilot magnetic compass
2	Copilot digital chronometer
3	Copilot audio control panel
4	Copilot remote bugs panel
5	Master caution light
6	Master warning light
7	Copilot Primary Flight Display (PFD 1)
8	Copilot Multifunction Display (MFD 1)
9	Standby electronic indicator
10	Secondary EDU (EDU 2)
11	Primary EDU (EDU 1)
12	STATIC switch
13	Copilot RTU panel (RTU 1)
14	APMS panel
15	Pilot RTU panel (RTU 2)
16	Pilot Primary Flight Display (PFD 2)
17	Pilot Multifunction Display (MFD 2)
18	Pilot digital chronometer
19	Pilot audio control panel
20	Pilot remote bugs panel
21	Pilot magnetic compass

Hydraulic system

The hydraulic power system includes: the main hydraulic system, the utility hydraulic system, the indicating system.
The main hydraulic system includes two independent sub-system:
– The No 1 main hydraulic system
– The No 2 main hydraulic system.
Both systems (No 1 and No 2) supply the hydraulic power for operation of the flight controls. Each system, operating at a pressure of 1500 psi, includes a suction circuit, a pressure circuit, a return circuit and a bypass circuit.
The utility hydraulic system includes two sub-systems:
– The main system
– The emergency system.
The main system supplies hydraulic power for operation of the landing gear (through the landing gear control panel), the wheel brakes (through the brake pedals installed on the pilot's rudder pedals), the rotor brake (through the rotor brake control lever) and the nose wheel centering-lock (through the nose wheel lock control lever on the front console).
The emergency system supplies hydraulic power for operation of the landing gear, the nose wheel-centering lock and the wheel brakes.

Electrical Power

The main sources of electrical power are the engine-driven generators and the 24 V DC battery.
The electrical power system includes:
– The Alternating Current (AC) generation system
– The Direct Current (DC) generation system
– The External power system
– The AC electrical load distribution system
– The DC electrical load distribution system.

A/C generation system

The main components of the AC generation system are as follows:
– The two inverters
– The two sensing relays.
The inverters are of the single-phase static-type and require a 28 V DC power supply.
Each inverter provides a 115 V AC and a 26 V AC output.

The maximum output power available from a combination of 115 V AC and 26 V AC output power is 250 VA.
If one Inverter has a failure, the other inverter, by its control relay give the power to the loads of the bus supplied by the unserviceable inverter. Each sensing relay sends a failure signal to the DAU which causes the display of the INV 1 or INV 2 caution message on the EDU1, when the related inverter is inoperative, and provides switching of the failed inverter loads to the operative inverter.
The system is powered through the circuit breakers that follow:
– INV 1 (28 V DC EMER BUS #1)
– INV 2 (28 V DC BUS #2).

D/C generation system

The 28 V DC electrical power is supplied by:
– two generators driven by the engine
– a 24 V DC, 33 Ah nickel-cadmium battery

– an external power source when the helicopter is on the ground.

The 28 V DC electrical power is supplied by the two generators when the engines are operating; the generators operate also as starters. A control and adjustment circuit is associated to each generator; the circuit provides for voltage adjustment, load distribution during parallel operation and over-voltage and reverse current protection.

3. Aircraft main characteristics:

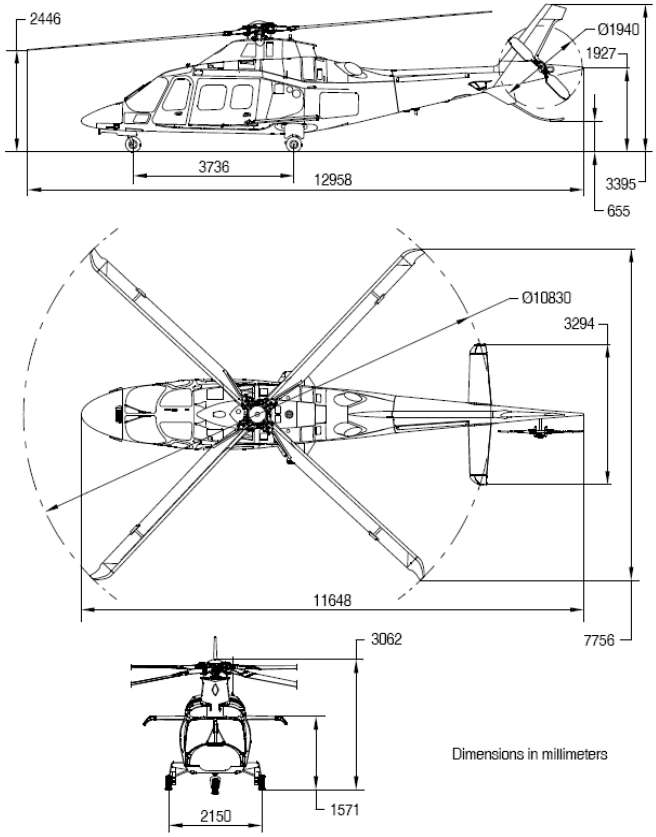
3.1 Sum up of main characteristics of the A109E, A109S & AW109SP

			A109E	A109S	AW109SP
Dimensions	Fuselage	Length	11,448 m	11,648 m	Identical
		Width	2,880 m	3,294 m	Identical
		Height	3,500m	3,395 m	Identical
	Main rotor	Diameter	10,830 m	10,830 m	Identical
	Tail rotor		2,000 m	1,940 m	Identical
Number of Main Rotor Blades			4	4	Identical
Minimum Flight Crew	VFR		1	1	Identical
	IFR		1	1	Identical
Seating Capacity	Including Pilot Seats		8	8	Identical
Engines			2 Pratt & Whitney PW206C or 2 Turbomeca Arrius 2K1	2 Pratt & Whitney PW207C	Identical
Fuel tanks	Total		595 l	563 l	Identical
Air Speed	Power ON	Absolute VNE	168 kt	168 kt	Identical
	Power OFF		128 kt	128 kt	Identical
Rotor Speed	Power ON	AOE	102% 99%	101% 99%	Identical
	Power OFF		110% 90%	110% 95%	Identical
Maximum Operating	Pressure Altitude		20 000ft	20 000ft	Identical
MTOM with Internal load			2850 Kg	3175 Kg	Identical
MTOM with External load			3000 Kg	3200 Kg	Identical
Category A see RFM Supplement	Density Altitude	Clear Heliport	8.000 ft	12.000 ft	12000 ft
		VTOL operations	8.000 ft	12.000 ft	12000ft

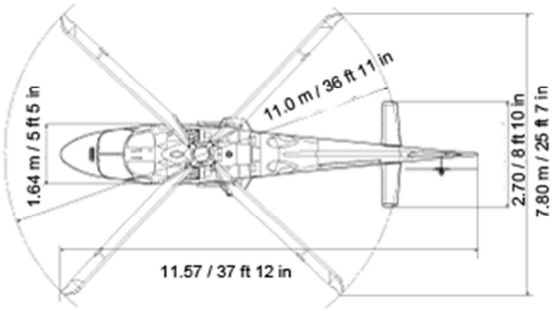
(Reading mode: column by column from the left to the right side →)

3.2 Exterior Dimensions

A109S & AW109SP



A109E



4. Operator Difference Requirement (ODR) Tables

Operator Difference Requirement tables have been produced by AgustaWestland to evaluated through an OEB catch up process the three models A109E, A109S & AW109SP on Pilot Initial and Additional Training course and difference training courses. The A109E is considered as base aircraft and following the scheme :

- From A109E to A109S
- From A109E to AW109SP
- From A109S to AW109SP
  (See Appendix 6).

5. Optional specific equipment

No optional specific equipment is provided requiring specific training.

6. Master Difference Requirement (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 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)

PC = means Proficiency Check (i.e. LST, LPC or OPC)
Full Flight Simulator 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 PART-FCL 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 in the helicopter
- No Helicopter class Rating
- Limited number of Flight Simulation Training Device..

6.2 Training, Checking, and Recurrent Training difference requirements table

		From Helicopter	
		A109E	**A109S**
To Helicopter	**A109S**	**D/D/D**	**N/A**
	AW109SP	**D/D/D**	**D/D/D**

T2 and T3 test have been performed to evaluate the general handling qualities and systems differences between:

- A109E to A109S
- A109E to AW109SP
- A109S to AW109SP

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

The following elements require a level “D” difference training, checking and currency:

- New 4 axis Auto Pilot
- New cockpit layout for the AW109SP

The Operational Evaluation Board has considered the A109E, A109S & AW109SP, and classified these three helicopters in a separate type from the previous A109A, A109A II, A109 C, A109K2 and A109LUH.
Differences course are required in between A109E, A109S & AW109SP variants as mentioned in the following paragraphs.

7. Type Rating List and Licence Endorsement List

7.1 Type Rating List

The proposal of this OEB is to up dated Class & Type Rating List as following:

- Table 9 / Type Rating List (Helicopters)

1 Manufacturer	2 Helicopter	3	4 Licence endorsement
AgustaWestland			
- ME Turbine -	A109E A109S AW109SP	(D)	**AW109**

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

7.2 Licence Endorsement List

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

1 Manufacturer	2 Helicopter	3	4 Licence endorsement
AgustaWestland			
- ME Turbine -	A109A A109A II A109C	(D)	**A109**
	A109K2		
	A109LUH		
	A109E	(D)	**AW109**
	A109S		
	AW109SP		

This Licence Endorsement List – Type Ratings (Helicopters) up dated.

8. Specification for Training

8.1 General

In the initial report the Type Rating Training courses proposed by AgustaWestland Training Academy for the A109E, A109S & AW109SP fulfilled the minimum requirements of Appendix 1 to JAR-FCL 2.261 (a) and Appendix 1 to JAR-FCL 2.261 (b) .
The assessment was based on the A109E, A109S & AW109SP Pilot Initial and Additional Type Rating Training syllabi, and difference training between variants proposed by AgustaWestland Training

Academy approved by ENAC ITALY and to Training courses from other European TRTOs' already approved by their national Authorities.

In regards with the initial OEB Report (19 04 2011) AgustaWestland Training Academy has reviewed a part of the AW109 type Rating Training courses, which fulfilled the minimum requirements of the Part-FCL in AMC2 FCL.725 (c) and (d)

Different qualification Level of FSTD's and a Virtual Interactive Procedure Trainer (VIPT) are now part of the training..

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

- Prerequisites for entry onto the specific course,
- Theoretical knowledge instruction syllabus and test summary,
- Helicopter flight training courses,
- FSTD training courses (when available),
- Additional training courses including OTD (when available),
- Skill test.

8.1.2 General Description of the AW109SP – VIPT

The Virtual Interactive Procedural Trainer (VIPT) is considered as an "Other Training Device" (OTD) . It is a stand-alone structure provided with touch-screen monitors, pilot and co-pilot seats, simplified pilot flight controls and Instructor Operating Station (IOS).
The mechanical structure includes the computers necessary to simulate the helicopter and its systems in ground and flight conditions.

The touch-screen monitor display a graphical interactive and dynamic representation of the cockpit panels, controls, indicators and displays. The layout of the information displayed on the monitors is representative in terms of size, proportion and displacement, of the actual helicopter.

The Virtual Interactive Procedural Trainer (VIPT) is a procedural and familiarization training tool that gives pilots the ability to "learn by doing". Pilots can train on a range of normal and abnormal procedures in free play simulation.

In particular, the AW109SP VIPT provides a complete training environment for system familiarization and operation, normal and emergency procedures, FMS navigation and display symbology, familiarization related to the systems/subsystems of the basic configuration of the helicopter.

8.2 Course pre-entry requirements

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 (c), specific for the issue of an initial multi-engine, single or multi-pilot helicopter.

8.3 Licensing requirements

All students must fulfil the requirements of Part-FCL Appendix 9, Flight instruction and skill test.
The AMC2 FCL.725 (a) of the Part –FCL requires (Appendix 2):

- for an Initial issue of a SPH, MET (H) CS 27 and 29 , an approved flight instruction of at least:

Helicopter types	In Helicopter	In Helicopter and FSTD associated training Credits
SPH MET (H) CS and FAR 27 and 29	8 hrs	Using FS C/D: At least 2 hrs helicopter and at least 10 hrs total Using FTD 2/3: At least 4 hrs helicopter and at least 10 hrs total

- for an additional issue of a SPH, MET (H) CS 27 and 29 , an approved flight instruction of at least:

Helicopter types	In Helicopter	In Helicopter and FSTD associated training Credits
MET(H) to MET(H)	3 hrs	Using FS C/D: At least 1 hr helicopter and at least 4 hrs total Using FTD 2/3: At least 2 hrs helicopter and at least 5 hrs total

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

- *complexity of the aircraft type, handling characteristics, level of technology;*
- *Category of helicopter (SEP or SET helicopter, multi-engine turbine and multi Pilot helicopter);*
- *previous experience of the applicant.*

8.4 Initial, Additional Type Rating & Difference training courses

8.4.1 Initial Type Rating (ITR)

Candidates for the Initial A109E, A109S or AW109SP 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 Part –FCL Subpart H – Section 1 & 3
- Have 70 Flight Hours as PIC
- Hold a Multi Engines Turbine pre-entry course (ref. Appendix 1 JAR FCL 2.255)

8.4.2 Additional Type Rating (ATR)

Candidates for an Additional A109E, A109S and AW109SP Type Rating must:

- Hold a valid Pilot license,
- Hold a Multi-Engine Turbine Pilot Type Rating
- Comply with the requirements set out in Part FCL Subpart H – Section 1 & 3.

8.4.3 Difference training courses in between variants:

From **A109E** to **AW109S** **(Δ 1)**
From **A109E** to **AW109SP** **(Δ 2)**
From **A109S** to **AW109SP** **(Δ 3)**

8.5 Theoretical knowledge syllabus and test summary

8.5.1 Initial and Additional Type Rating

Theoretical instruction should be provided in accordance with Part – FCL Subpart H – Section 1 – FCL.710.
The following sections present a summary of the material for an Initial and additional Type Rating training program should consider. Whilst based on the AgustaWestland programs. Training providers should ensure their type specific courses cover the pertinent material.

Note : If an initial type rating for a turbine powered aircraft is required, the candidate must first undergo a turbine engine course.

Initial and Additional Type Rating theoretical knowledge syllabus	**A109E and A109S**	**AW109SP**
Helicopter structure, transmissions, rotors and equipment, normal and abnormal operation of the systems	19h30	28h30
Limitations (**)	2h00	3h00
Performance, flight planning and monitoring (**)	3h00	3h00
Weight and balance, servicing	1h00	1h00
Emergency procedures (**)	3h00	3h00
Special requirements for helicopters fitted with electronic flight instrument systems or equivalent equipment, Systems Integration and Display, Navigation, FMS ; when applicable	3h00	12h00
Optional equipment	In addition	In addition
TOTAL THEORETICAL KNOWLEDGE SYLLABUS	**31h30**	**50h30**
Theoretical examination session	1h30	1h30
TOTAL	**33h00**	**52h00**

(**) *theoretical instruction elements can be covered during the ground training course and/or during flight training briefing phase.*

On completion of the theoretical phase, the trainee is assessed via a multiple-choice questionnaire (*a minimum of 50 questions is recommended*) covering the entire program. To obtain the type rating, the threshold for passing is 75% of correct answers in the written examination on a range of multiple-choice or computerized questions.

8.5.2 Difference training courses in between variants

Theoretical instruction should be provided in accordance with Part FCL by considering the previous experience of the applicant.

Theoretical knowledge difference training in between variants	**Δ 1** **A109E →A109S**	**Δ 2** **A109E →AW109SP**	**Δ 3** **A109S →AW109SP**
Helicopter structure, transmissions, rotors and equipment, normal and abnormal operation of the systems	2h00	6h00	2h00
Limitations (**)	2h00	2h00	-
Performance, flight planning and monitoring (**)	2h00	2h00	-
Weight and balance, servicing	1h00	1h00	-
Emergency procedures (**)	2h00	2h00	1h00
Special requirements for helicopters fitted with electronic flight instrument systems or equivalent equipment, Systems Integration and Display, Navigation, FMS ; when applicable	4h00	12h00	12h00
Optional equipment	In addition	In addition	In addition
TOTAL THEORETICAL KNOWLEDGE SYLLABUS	**13h00**	**25h00**	**15h00**
Theoretical examination session	1h00	1h00	1h00
TOTAL	**14h00**	**26h00**	**16h00**

(**) *theoretical instruction elements can be covered during the ground training course and/or during flight training briefing phase.*

8.6 Flight training course summary (VFR)

8.6.1 Initial Type Rating (ITR)

Initial VFR Type Rating (ITR)	A109E			A109S		AW109SP	
OTD / VIPT : Virtual Interactive Procedural Trainer : System Overview, Operating procedures, System Malfunction, Sample VFR flights.	N/A	N/A	N/A	N/A	N/A	4h00	4h00
Flight Simulation Training Device & Helicopter	**FFS + Helicopter**	**FTD + Helicopter**	**Helicopter only**	**FFS* + Helicopter**	**Helicopter only**	**FTD + Helicopter**	**Helicopter only**
Pre-flight (when applicable), cockpit, engine start, Shut down, Basic air work, General Handling, Various touch-downs	1h15	1h30	1h15	1h30	1h15	1h15	1h15
Circuits and Various touch-downs.	1h15	1h15 In Helicopter	1h15	1h15 In Helicopter	1h15	1h15 In Helicopter	1h15
Systems Integration and Display, Navigation, FMS, System Malfunction, Emergency procedures.	1h15	1h15 In Helicopter	1h15	1h15 In Helicopter	1h15	1h15 In Helicopter	1h15
Systems Integration and Display, Navigation, FMS, System Malfunction, Emergency procedures.	-	-	-	-	-	1h15	-
Abnormal and Emergency Procedures.	1h15	1h30	1h15	1h30	1h15	1h15	1h15
Abnormal and Emergency Procedures.	-	-	-	-	-	1h15	-
Simulated Engine failure, Hydraulic failure, Manual Control of engine power, Straight in Autorotation	1h30	1h30	1h30	1h30	1h30	1h30	1h30
Various Autorotations. Clear Area CAT A take-off and landing AEO and OEI training procedures	1h30	1h30	1h30	1h30	1h30	1h30	1h30
Consolidation Session: Pre-flight, cockpit, engine start, Basic air work, General Handling, clear area CAT A take-off and landing AEO and OEI training procedures and reviewing of emergency procedures (as applicable)	2h00 In Helicopter	1h30 In Helicopter	-	1h30 In Helicopter	-	1h30 In Helicopter	-
Total Flight Simulation Training Device	8H00	6H00	-	6H00	-	8H00	-
Total Helicopter	2H00	4H00	8h00	4H00	8H00	4H00	8H00
Total Flight Training	**10h00**	**10h00**	**8h00**	**10h00**	**8h00**	**12h00**	**8h00**
Skill Test *In accordance with Part FCL Appendix 9.*	**Required**	**Required**	**Required**	**Required**	**Required**	**Required**	**Required**

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

Each helicopter flight session could be extended or reduced at the discretion of the instructor. Additional flight could be necessary at the discretion of the instructor if the trainee has not successfully demonstrated the ability to perform all maneuvers with a high degree of proficiency.

*Notes: * The FFS level D is the A109E simulator, this device can be used only for a part of training based on commonalty between the two variants(See paragraph 8.6.3)..*

8.6.2 Additional Type Rating (ATR)

Additional VFR Type Rating (ATR)	A109E			A109S		AW109SP	
OTD / VIPT: Virtual Interactive Procedural Trainer : System Overview, Operating procedures, System Malfunction,	N/A	N/A	N/A	N/A	N/A	2h00	2h00
Flight Simulation Training Device & Helicopter	**FFS + Helicopter**	**FTD + Helicopter**	**Helicopter only**	**FFS* + Helicopter**	**Helicopter only**	**FTD + Helicopter**	**Helicopter only**
Pre-flight, cockpit (when applicable),, engine start, Shut down, Basic air work, General Handling, Various touch-downs	1h15	1h15	1h15	1h15	1h15	1h15	1h15
Systems Integration and Display, Navigation, FMS, System Malfunction	-	1h30	1h15	-	-	1h30	1h00
Systems Integration and Display, Navigation, FMS, System Malfunction	-	1h15	-	-	-	1h15	-
Systems and System Malfunction, Abnormal and Emergency Procedures.	1h15	-	-	1h15	1h15	1h00 In Helicopter	1h15
Various Autorotations , Clear Area CAT A take-off and landing AEO and OEI training procedures	1h30	1h30 In Helicopter	-	1h30	1h30	1h00 In Helicopter	1h30
Consolidation Session: Pre-flight, cockpit, engine start, Basic air work, General Handling, clear area CAT A take-off and landing AEO and OEI training procedures and reviewing of emergency procedures (as applicable)	2h00 In Helicopter	1h30 In Helicopter	1h30	2h00 In Helicopter	-	2h00 In Helicopter	-
Total Flight Simulation Training Device	4h00	4h00	-	4h00*	-	4h00	-
Total Helicopter	2h00	3h00	4h00	2h00	4h00	4h00	5h00
Total Flight Training	**6h00**	**7h00**	**4h00**	**6h00**	**4h00**	**8h00**	**5H00**
Skill Test *In accordance with Part FCL Appendix 9*	Required			Required	Required	Required	Required

*Notes: * The FFS level D is the A109E simulator, this device can be used only for a part of training based on commonalty between the two variants (See paragraph 8.6.3).*

8.6.3 Training impact on A109S using A109E Full Flight Simulator (FFS)

Only similar elements and procedures between the two variants will be trained on the FFS of A109E.

A109E	AW109S
V TOSS:30kts : identical	
Vy 60kts	Vy 75kts
Vlo / Vle 140 : identical	
VNE 168kts : identical	
Engine Model: PW206	Engine Model: PW207 more powerful
Fuel panel and testing procedures : identical	
SAS panel and testing procedures : same panel with only one difference on the procedure	
Managing and testing procedures of the Flight Director(F/D) panel : identical	
HYD panel and testing procedures: identical	
Cockpit panel: KRATOS EFIS (old type) same position of instruments and same visual indications (bearing pointer, NAV source, etc.)	Cockpit panel: ASTONAUTICS EFIS (new type) same position of instruments and same visual indications (bearing pointer, NAV source, etc.)
Landing Gear lever, Nose Wheel lock, NR102% position: identical	
Normal take-off procedure with and without emergency: identical	
HYD Failure procedure: identical	
SAS Failure procedure: identical	
F/D position and use: identical	
Ground Rolling speed: identical	
Cockpit layout and overview: identical	
NAV/COM: different brand (Collins or King)	NAV/COM: integrated in GARMIN GPS 530 and 430
OEI Training mode: no difference in position and use	
CAT A Clear Area take off: same procedure except for Vy	
CAT A Clear Area approach: identical	
CAT A profile: same procedure with one more profile for AW109S (helipad vertical take off)	
Management of CAT A profile emergency: same procedure except for Vy	

8.6.4 CAT A Training procedures

For Operations in hostile and congested environment (ref. JAR OPS 3) CAT A profiles have to be thought. Based on previous experience of the applicant these CAT A sessions can either be included in the standard training or in addition as followed:

Initial and Additional VFR Type Rating - Cat A profiles				
	A109E		A109S	AW109SP
Flight Simulation Training Device & Helicopter	**FFS**	**Helicopter only**	**Helicopter only**	**Helicopter only**
All CAT A take-off and landing AEO and OEI training procedures.	3h00	3h00	3h00	3h00
Total Flight Training	**3h00**	**3h00**	**3h00**	**3h00**
Skill Test *In accordance with Part FCL Appendix 9*	As Required	As Required	As Required	As Required

8.7 Difference training

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			
	Δ 1 **A109E →A109S**	**Δ 2** **A109E →AW109SP**	**Δ 3** **A109S →AW109SP**
OTD / VIPT : Virtual Interactive Procedural Trainer : System Overview, Operating procedures, System Malfunction, Sample VFR flights	N/A	2h00	2h00
Helicopter	**Helicopter**	**Helicopter**	**Helicopter**
Pre-flight, cockpit, engine start, Shut down, Basic air work, General Handling, Various touch-downs.	1h00	1h15	1h00
Systems and Display: Normal, Abnormal and Emergency procedures	1h00	-	-
Integrated Systems and Display, Navigation and FMS: Normal, Abnormal and Emergency procedures.	-	2h45	1h00
Total Flight Training	**2h00**	**4h00**	**2h00**
Skill Test *In accordance with Part FCL Appendix 9*	Not Required	Not Required	Not Required

After completing the training on the aircraft considered, the accomplishment of which is recorded on the applicant's flight log and signed by the TRI.

8.8 Instrument Rating Extension to:

IR Extension Courses	Initial Type Rating					Additional Type Rating				
Applying on	**A109E**	**A109S**		**AW109SP**		**A109E**	**A109S**		**AW109SP**	
Theoretical course (including Theo. exam)	N/A	N/A		N/A		N/A	N/A		N/A	
OTD	-	-	-	4h00	4h00	-	-	-	4h00	4h00
FSTD & Helicopter	FFS + Helicopter	FFS + Helicopter	Helicopter only	FTD + Helicopter	Helicopter only	FFS + Helicopter	FFS + Helicopter	Helicopter only	FFS + Helicopter	Helicopter only
FTD	-	-	-	8h00	-	-			6h00	
FFS	8h00	6h00*	-	-	-	6h00	2h00*	-	-	-
Helicopter	**2h00**	**4h00**	**06h00**	**2h00**	**6h00**	**-**	**2h00**	**4h00**	**-**	**4h00**
+ Skill test	yes	yes	yes	yes	yes	yes	yes (FS)	yes	yes	yes

Initial and Additional Rating

*Notes: * The FFS level D is the A109E simulator, this device can be used only for a part of training based on commonalty between the two variants(See paragraph 8.6.3)..*

Difference Training between variants:

IR Extension	Difference courses		
Applying on	**Δ 1** **A109E →A109S**	**Δ 2** **A109E →AW109SP**	**Δ 3** **A109S →AW109SP**
OTD	-	04h00	04h00
FTD	-	-	-
FFS	-	-	-
Helicopter	01h00	04h00	04h00
+ Skill test	N/A	N/A	N/A

IR extension training courses are detailed and based on AgustaWestland Training Academy syllabus (See Appendix 3)

8.8 Specifications for particular emphasis during training

The OEB recommends the Training Organisations to put particular emphasis for all the variants the correct use of:

- manual engine and acknowledgement of related chart from engine maintenance manual;
- OEI TNG and limitations, WAT chart and correct profiles.

Furthermore for the AW109SP, while is considered to have high level of automatism, to pay particular attention to the correct use of:

- 3D Displays;
- F/D upper modes and limitations;
- VFR/IFR approach and limitations;
- GA/TU button and difference;
- Highway in The Sky (HITS);
- Terrain Awareness & Warning System (TAWS);
- TCAS;
- Flight Planning

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

9.1 Skill test & Proficiency Checks

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

9. 2 Currency & Recent experience Requirements

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

As illustrated in Chapter 2, paragraph "Instrument panel and console" of this report, the A109E and A109S variants are considered as conventional cockpit helicopter while the AW109SP variant is a digital glass-cockpit helicopter, the OEB recommends that, Pilots should fly both variants conventional and digital glass-cockpit within 12 months to maintain currency on those variants. If this condition is not met, refresh training should be taken. This training should include a review of:

- RFM latest changes (if any)
- performances and limitations
- normal, abnormal and emergency procedures and

Flight or FSTD's session(s) as proposed by AgustaWestland Training Academy (See Appendix 3)

10. Specification for Flight Simulation Training Devices

When this Report Revision 1 has been finalized, the following Training devices were available and qualified in accordance with CS-FSTD (H) :

- A109E FFS Level D and
- A109E FTD Level 3
- AW109SP FTD Level 3.

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.R005
Appendix 2 : PAR-FCL - Type rating requirements
Appendix 3 : AW109 Pilot Training Syllabi, From AgustaWestland Training Academy
Appendix 4 : A109S Compliance with JAR-OPS 3 Subpart K& L Requirements
Appendix 5 : AW109SP Compliance with JAR-OPS 3 Subpart K& L Requirements
Appendix 6 : Operator Difference Requirement (ODR) Tables

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