



EUROPEAN AVIATION SAFETY AGENCY

EXPERT DEPARTMENT / CERTIFICATION DIRECTORATE



Operational Evaluation Board Report

Final Report

Report Revision 4 dated: 15 10 2012

Manufacturer: AgustaWestland

AB / AW 139

**European Aviation Safety Agency
Postfach 10 12 53
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Preamble

Original report and revision reports are in compliance with the JAA Terms of References for JOEB, corresponding complementary Procedures Document and the JOEB handbook. These report revisions specified the JAA and EASA minimum requirements for the initial & Additional Type Rating Training Course, Checking and Currency and contained the findings of the operational acceptability of the AB/AW 139 /AW 139 with regards to JAR-OPS 3.

Upon Type Certificate Holder request, on August 22nd, 2006 EASA Executive Director approves (EASA. R.C. 01901) the name change and new product identification:

- **AB/AW 139** up to S/N 31054
- **AW 139** from S/N 31055 onwards

All the Associated Technical Documentation have been re-issued by the Company as follow:

1. Rotorcraft Flight Manual N° 139G0290X001 (3 display) First Issue (See paragraph 8).
2. Rotorcraft Flight Manual N° 139G0290X002 (4 display) First Issue
3. Maintenance Manual 39-A-AMPI-00-P Second Issue

Effective 01 June 2011, the Agusta S.p.A. name was changed to AgustaWestland S.p.A.

Major changes:

The following major changes affecting the helicopter AB/AW 139 configuration and/or operational capability have been approved by EASA:

- Cargo Hook
- Cargo Hook Utility Video Cameras
- Second Transponder
- Weather Radar Primus 701
- External Loud Speakers
- Snow skids / Slump Pads
- Extension of the generator capability to 600Amps
- EGPWS MK XXII
- TCAS I KTA 970
- Weight increase to 6800 Kg
- Kit NVG
- Epic Software Phase 5
- Full Ice Protection System (FIPS)
- Rescue Hoist
- Tail Rotor Blades
- Ditching configuration
- Searchlights
- FLIR
- Goodrich Landing Gear

Note:

For the purpose of this report, AB 139 or AB/AW 139 will be considered as the same AgustaWestland helicopter.

AW139



Revision Record

Revision No.	Section	Pages No.	Date
Original	All	All	14/02/2006
Revision 1	3.2	13	07/08/2006
Revision 2	All	All	24/01/2007
Revision 3	All	All	15/04/2009
Revision 4	All	All	15/10/2012

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

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Executive Summary

1. Manufacturer Application

Agusta Manufacturer made a first Application to the Joint Aviation Authorities (JAA) to conduct an operational evaluation (OE) of the Agusta AB 139. The original JOEB report as been published on February 14th, 2006. The JOEB performed a T5 test, according to JAA specific regulation and guidance for a new aircraft.

Three revision reports have been produced following the original report, “revision 1” (August, 7th 2006), “revision 2” (January, 24th 2007) and “revision 3” (15th of April 2009) but only the original report from February, 14th 2006 has been published by EASA .

This Report “Revision 4” based on the previous evaluations is the result of a catch up process evaluation which has been made by analysis and comparison between the previous AB/AW 139 Pilot Type Rating Training courses and the up dated version provided by the AgustaWestland Training Academy requested by Application APPL/2011-079.

This final report revision “4” supersedes all the previous reports.

2. OEB recommendations

The OEB recommends for approval by NAAs:

- Pilot Initial Type Rating Training minimum syllabi
- Pilot Additional Type Rating Training minimum syllabi
- Instrument Rating Extension
- Currency and Recent experience
- Training area of special emphasis
- The standard offered for AB/AW 139 which is in compliance with JAR-OPS 3 Subpart K&L. (See Appendix 5).

3. Procedures, requirements and associated AMC references

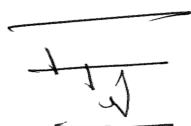
The EASA–Section Manager Operational Suitability Rotorcraft / Balloons / Airships and AgustaWestland experts have participated actively to this evaluation (*Refer to the list page 6*). EASA and AgustaWestland experts have conducted this OEB revision “4” in accordance with JAR-OPS 3, Part-FCL and CS-FSTD (H) requirements including associated appendices, AMC and GM.

Note on references and reference texts:

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

François FABRE

EASA – Deputy Head of Expert Department
Certification Directorate



Acronyms

ADS	Air Data System
AFCS	Automatic Flight Control System
AMC	Acceptable Means of Compliance
AOC	Air Operator Certificate
ATPL	Airline Transport Pilot License
ATR	Additional Type Rating
CAS	Crew Alerting System
CBT	Computer Based Training
CDP	Critical Decision Point ((namely TDP and LDP)
CPL	Commercial Pilot License
CRM	Crew Resource Management
EEC	Electronic Engine Control
EGPWS	Enhanced Ground Proximity Warning System
ENAC	Italian Civil Aviation Authority
FMS	Flight Management System
FD	Flight Director
FIPS	Full Ice Protection System
FTO	Flight Training Organisation
GPS	Global Positioning System
IEM	Interpretative and Explanatory Material
IFR	Instrument Flight Rules
IR	Instrument Rating
ITR	Initial Type Rating
JAA	Joint Aviation Authorities
JAR-FCL 2	Joint Aviation Requirements Flight Crew Licensing (Helicopters)
JAR-OPS 3	Joint Aviation Requirements Operations 3 (Commercial Transport Helicopters)
JOEB	Joint Operational Evaluation Board
JSET	Joint Simulator Evaluation Team
LIFUS	Line Flying under Supervision
MDR	Master Difference Requirements
MEL	Minimum Equipment List
MFD	Multi-function Display
MMEL	Master Minimum Equipment List
OAT	Outside Ambient Temperature
ODR	Operator Differences Requirements
OE	Operational Evaluation
ORI	Operational Review Item
PI	Power Index
PCM	Project Certification Manager
PFD	Primary Flight Display
RFM	Rotorcraft Flight Manual
SAS	Stability Augmentation System
TCCA	Transport Canada Civil Aviation
TCAS	Traffic Collision and Avoidance System
TRTC	Type Rating Training Course
TRTO	Type Rating Training Organisation
T5 Test	Refer to FCL/OPS Common Procedure Document
VFR	Visual Flight Rules

1. Purpose and applicability

Data is being submitted by AgustaWestland in support of this OEB Report "Revision 4". This report is the result of a catch up process evaluation which has been made by analysis and comparison, based on up dated Pilot Type Rating Training syllabi and on previous Report Revisions.

This document:

- Provides a general description of the AB/AW 139 helicopter
- Describes the change in term of minimum Flight Crew for VFR day / night and IFR
- Updates the Type Rating List
- Makes recommendations for minimum Training Syllabus for the AB/AW139 to:
 - Pilot Initial Type Rating Training minimum syllabi (ITR)
 - Pilot Additional type rating minimum syllabi (ATR)
 - Instrument Rating Extension (IR)
 - Currency and Recent experience
 - The standard offered for AB/AW 139 which is in compliance with JAR-OPS 3 Subpart K& L .

The MMEL is a stand-alone document is not part of this report. (See Appendix 7).

Note:

AB/AW 139 is listed in the Type Certificate Data Sheet delivered by EASA under Type Certificate Data Sheet EASA TCDS.R.006 (See Appendix 1)

2. General Description of AW 139

General

The AW139 is a medium Twin Engine helicopters (MET-H), powered by two turbo-shaft engines. The helicopter has a five-blade fully articulated main-rotor and a four-blade fully articulated tail rotor.

Airframe / Seating

The structure is made up of three main modules: the cockpit, the cabin and the tail-boom.

The cockpit includes the pilot (RH) and co-pilot (LH) seats. The seats are installed side by side, adjustable and crash-worthy.

The cabin includes the passenger seats and the baggage-bay area at the back of the fuselage. A full size plug-in sliding door is located on each side of the cabin area. Each sliding door has two acrylic-plastic windows, and can be secured in the open or closed position.

The seating arrangements can be changed depending on the configuration:

Standard civil transport : 12 passengers

High density civil transport : 15 passengers

Civil EMS 6 litter patients, 2 non-litter patients and 2 medical attendants

Two forward opening hinged-doors with an emergency release give access to the cockpit on both sides. Large glass windshields and clear acrylic windows installed on the crew doors, lower nose, and roof area give the crew good visibility.

The tail-boom is connected to the back of the fuselage and can be removed.

The tail-boom holds the tail-rotor and drive-train, the vertical fin and the horizontal stabilizer.

Landing Gear

The Landing Gear (LG) is a “fore and aft” retractable front tricycle type, that includes two single main-wheels (main landing gear) and a twin nose wheel (nose landing gear). The LG provides shock absorption and rebound control and has an emergency lowering system. The Main Landing Gear (MLG) includes a differential braking system and a parking brake. The nose-wheel has an automatic centering and centerlock system installed. The nose-wheel can be steered by pilot controlled inputs.

Main Rotor

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

The blades are made of composite materials except the metallic erosion shields (central (steel) and tip (nickel) leading edges) the 2 trim tabs per blade and some other minor parts while the hub is an hybrid structure made of metal and composite material.

The main rotor is a fully articulated type with 5 blades. It is equipped with elastomeric bearings for the flapping motions, lead-lag and pitch change articulations.

The lead lag motion is reacted by hydraulic dampers (1 for each blade) that provide also the stops (cushion areas). A separated stop system is provided for the flapping motions. The upper stop is provided with a support (for the flight position) and a limiter (for ground position) while the lower stop is provided with a sliding ring both for flight and ground conditions.

The rotor head is composed of the hub made of titanium, the composite tension links, the elastomeric bearings, the dampers and the pitch control levers.

The rotating control system is composed of the following parts: the pitch links, the Swashplate, the spherical pivot.

Tail Rotor

The Tail Rotor is a four blade fully articulated rotor with elastomeric bearings, which allow flapping, lead-lag and feathering movements.

The tail rotor system includes the components that connect the tailrotor hub and the Tail-Rotor gearbox (TGB). And also, the parts that translate the output movements of the tail-rotor actuator pitch change rods, into pitch changes of the rotor blades.

The tail rotor system includes: the tail rotor blades, the tail rotor head and the tail-rotor rotating controls.

Full Ice Protection System (FIPS) installation

With kit FIPS installed and operative, flight in known icing condition is allowed. Both main and tail rotor blades and the windshield are heated; a dedicated device is installed to detect and alert the crew on icing condition.

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 transmission receives the drive from the engines transferring the input to the main and tail rotors, but also to accessory components. It is made up of the main-rotor drive system and the tail-rotor drive system

Flight controls

The rotor flight control system transfers positive control of attitude, speed and altitude of the helicopter.

The system includes: the main rotor control system, the tail rotor control system and includes also the rotor flight-controls indicating system.

The main rotor control system controls includes a collective and a cyclic control system. The two systems are mixed to control the attitude and altitude of the rotorcraft. This is done by changing the angle of the main-rotor blades. The pilot and co-pilot collective-control sticks are connected together to give a common input to the mixing unit. The mixing unit receives collective and cyclic inputs, and gives a common output to three hydraulic actuators. The actuators then transmit a powered output to the main-rotor pitch-change mechanism. An electrical actuator connected to the crew controls can provide an AFCS command input to the collective controls.

The Cyclic control system is a mechanical, dual linkage system, controlled by the crews cyclic control sticks. The cyclic linkage gives the pitch and roll commands to the main-rotor pitch-change mechanism.

The mechanical linkage also gives a connection to two electrical trim actuators, which can give pitch and roll commands. The commands can be made by the crew or provided by the AFCS.

The tail-rotor controls are operated by mechanical linkages that give an input to a dual-channel hydraulic actuator. The actuator adjusts the tail-rotor pitch-change mechanism to give a yaw action. Each crewmember has dual-pedals to operate the mechanical linkages and the main wheel brakes. The linkages are also controlled by electrical actuators for manual and automatic trimming commands.

Rotor brake

The rotor brake system is used to stop the rotation of the rotor during engine power-off. The rotor brake system includes an actuator that moves a caliper providing the possibility to be activated, placing the dedicated pressure to grip the disc secured to the tail rotor drive pinion.

Engines

The AW139 is powered by two Pratt & Whitney Canada PT6C-67C turbine engines. The engines are installed in 2 separate fire-proof compartments above the cabin roof and are connected to the helicopter airframe and the Main Gearbox (MGB).

Each engine is a free turbine turbo-shaft propulsion engine that includes a four stage axial compressor and a one stage centrifugal compressor. The compressors are driven by a single-stage compressor turbine.

The power turbine turns the output shaft at the front of the engine.

Fuel system

This system has the primary function to store and deliver fuel to the engines. The fuel system includes: the storage system, the gauging system, the distribution system and venting with drainage.

The flexible bladder type fuel tanks are installed behind the passenger cabin. The tanks are interconnected, however retain a capacity of fuel below the interconnection to avoid a rupture of one fuel cell draining all fuel from the helicopter.

The tanks are filled via a gravity refuelling or as per customer request option, a pressure refuelling port may be installed. The fuel tanks and a supporting sealed tank structure have been demonstrated to be crash resistant. The fuel tanks incorporate inspection features, like access doors, water and fuel drain provisions.

The gauging system consists of fuel control unit and 4 off capacitance probes (2 off main probes, 2 off secondary probes). The response to the probes is reported to Pilot's Primary Display Unit, via the Fuel Control Unit.

The fuel control unit (FCU) controls the operation of the fuel cell mounted booster pump, shut off and cross-feed valve functionality. Either of the 2 off systems is capable of independent operation, or as required, cross-feed functionality via the manifold. Booster pumps provide primary motive flow to the powerplant portion of the fuel system, however the engine mounted high-pressure

pumps are capable of maintaining adequate fuel supply in purely suction mode. Pressure transducers and switches are incorporated to monitor system performance. The powerplant portion of the fuel system consists of an accessory gearbox (AG) mounted pump, and complementary fuel management unit, fuel heater, and nozzle manifold.

The fuel system incorporates venting and drainage provisions to preclude the build up of vapours or spillage. The fuel cells are vented to the atmosphere via independent lines incorporating a flame arrestor's and lightning protection features.

Instrument panels and consoles

AB / AW 139



Hydraulic system

The hydraulic power system supplies the hydraulic power necessary to operate the flight control servo-actuators and the landing gear. The system includes two independent circuits that supply hydraulic fluid at a nominal working pressure of 3000 psi (207 Bar). An indicating system can show the status of the system on the Cockpit Control Panel

The No. 1 hydraulic system supplies power to one channel of the main and tail-rotor actuators (three main-rotor actuators and one tail rotor actuator). The supply line of power to the flight-control actuators is referred to as the Flight Control Circuit.

The No. 1 hydraulic system also supplies back-up power to the landing-gear extension system; this system is referred to as the emergency circuit.

The No. 2 hydraulic system supplies power to one channel of the main and tail-rotor actuators (three main-rotor actuators and one for the tail rotor). The supply of power to the flight-control actuators is referred to as the Flight Control Circuit.

The No. 2 hydraulic system also supplies primary power to the landing- gear extension and retraction system; this system is referred to as the utility circuit.

Electrical Power

The electrical power system includes two sub-systems: the primary 28V DC power supply, and the secondary AC power generating system. DC and AC circuit breaker panels are installed in the cabin compartment. These circuit breaker panels include distribution protection devices necessary for flight safety.

- D/C generation system

The primary 28V DC power for the helicopter is supplied by two 30V 300A starter generators and two batteries. Each DC generator is driven through a gearbox by a main engine. The No. 1 generator is connected to the Main Bus No. 1, and the No. 2 generator to the Main Bus. No. 2.

Two batteries supply power to the starter-generators to start the main engines. The batteries also supply essential busses if there is a total loss of generator power

- A/C generation system (Optional)

The AC system is a dual 115 Vac and 26 Vac, 400 Hz single-phase system. The power is supplied by two inverters that can supply all of the helicopters AC requirements. The AC networks can be powered by the DC External Power Unit or by a Nickel-cadium battery (On the ground with the rotor stopped).

- FIPS generation system (Optional)

Electrical power is provided by two Main Gearbox mounted A/C generators. Electrical power to the blades is controlled by a control box and distributed through distribution boxes and slip rings. Atmospheric information is provided to the control box by Outside Air Temperature Sensors and Ice Detectors sensors (Liquid Water Content - LWC). The Ice Detectors and windshield heating are active at all times with the IPS ON.

3. Helicopter main characteristics

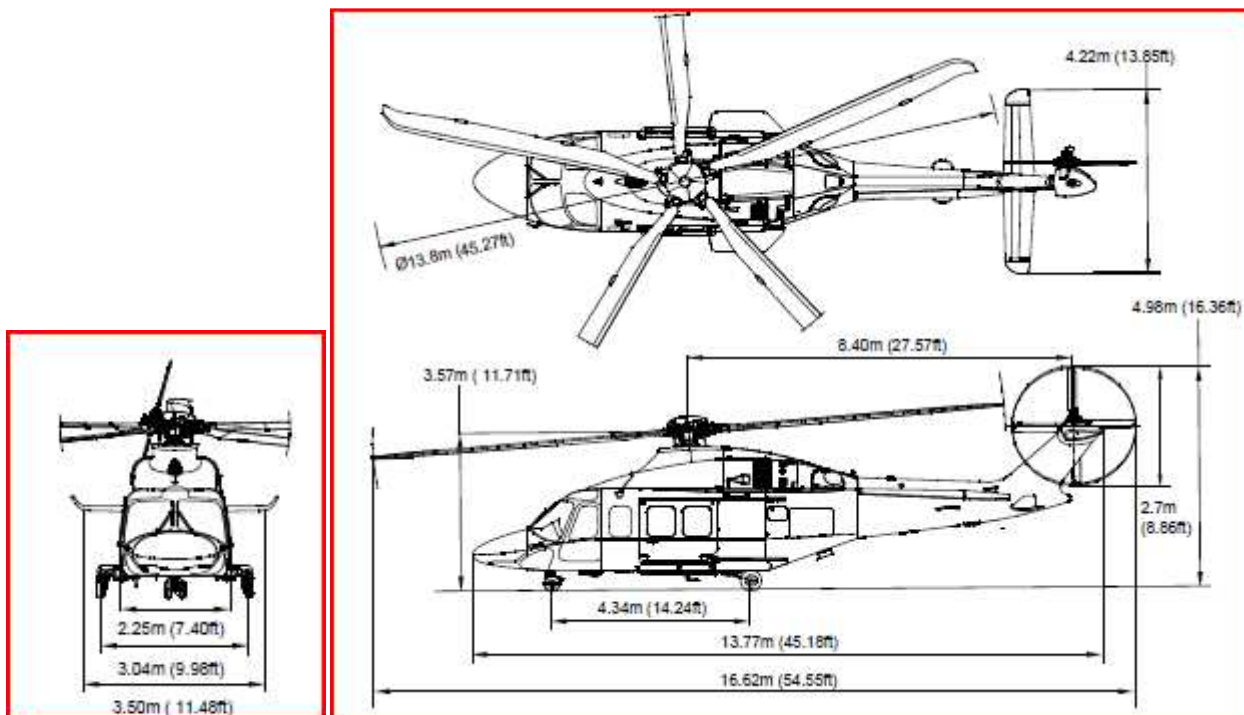
3.1 Sum up of main characteristics of the AW139

Dimensions	Fuselage	Length	16,62 m
		Width	3,50 m
		Height	4,98 m
	Main rotor	Diameter	13,80 m
	Tail rotor		2,70 m
Number of Main Rotor Blades			5
Minimum Flight Crew	VFR		1
	IFR		1
Seating Capacity	Including Pilot Seats		17
Engines			2 Pratt & Whitney PT6C-67C
Fuel Tanks - Standard - Auxiliary			1588 l 500 l
Air Speed	Power ON Absolute VNE		167 kt
	Power OFF VNE		150 kt
Rotor Speed	Power ON	AEO	106% 95%
	Power OFF		116% 90%
Maximum Operating	Pressure Altitude		20 000ft
MTOM with Internal load			6400 / 6800* Kg
MTOM with External load			6800 kg
Category A operations see RFM Supplement 12	Density Altitude	Clear Area	14.000 ft
		VTOL operations	14.000 ft

**Operation of the aircraft with MTOW up to 6800 kg is permitted according to RFM 139G0290X002 Supplement N°50 with kit P/N 4G0000F0011 installed.*

3.2 External Dimension

AB / AW139



4. Operator Difference Requirement (ODR) Tables

Due to the fact that the AB/AW 139 is a helicopter with no variants, no Operator Difference Requirement tables have been produced.

5. Optional specific equipment

No optional equipment is provided requiring specific training according PART-FCL regulation.

6. Master Differences Requirements (MDR):

Due to the fact that the AB/AW 139 is a helicopter with no variants, no Master Difference Requirement tables have been produced.

7. Type Rating List and Licence Endorsement List

Type Rating List

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

Table 9 / Type Rating List (Helicopters)

Manufacturer	Helicopter		Licence endorsement
AgustaWestland			
<i>-ME Turbine-</i>	AB139/AW139		A139
	A109E	(D)	AW109
	A109S		
	AW109SP		

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

8. Minimum Flight Crew & Take Off / Landings limitations

The AB/AW 139 helicopter was initially certified in June 2003.

The Type Certification Data Sheet (TCDS) stated that the Minimum Flight Crew was:

One (1) for VFR day and Two (2) for VFR night and IFR. These approvals were granted for the “three-display” cockpit configuration.

After that, a four-display configuration was developed by the Company to extend the helicopter capabilities. With this configuration the FMS became part of the basic equipment while a 4-axis FD was developed and certified as optional equipment.

Upon Type Certificate Holder request, on July 14th, 2006 EASA Executive Director approved (EASA. R.C. 01853) and Minimum Flight Crew has been accepted as followed:

One (1) for day/night VFR and IFR operations.

The certification process for the AB/AW 139 Single Pilot IFR/VFR night focused on the following areas:

- review of the Navigation, Communication and Crew Alerting System Safety Assessment
- pilot workload associated with IFR/VFR night single pilot operations (Appendix 10).
- review of the RFM changes

The following additional items are required for Single Pilot operations:

- Associated Technical Documentation:

Report n. 139G0290X002- Rotorcraft Flight Manual (4 display)

Quick Release Handbook

The EASA / TCDS. R.006 Section IV.

➤ Limitations and conditions :

Limited to 4 – display configuration

Single pilot operations are permitted only from the right hand seat

• Following elements are considered mandatory:

➤ **IFR single pilot**

Quick Reference Handbook

MAP/ Quick Reference Handbook holder

Flight Director (to be fully operative before flight and engaged during the flight within the limits of the systems)

➤ **VFR night single pilot**

Quick Reference Handbook

MAP/ Quick Reference Handbook holder

TCAS I

➤ **For Category A operations:**

“Cat. A take off and landings must be carried out from the right hand seat”

9. Specification for Training

9.1 General

The Type Rating Training courses proposed by AgustaWestland Training Academy for the AB/AW139 fulfill the minimum requirements of EASA Part-FCL.

The assessment is based on the AB/AW139 Pilot Initial Type Rating Training syllabi, proposed by AgustaWestland Training Academy and approved by ENAC Italy.

OEB recommends Pilot training syllabi divided into the following phases for approval in Approved Training Organizations (ATO):

- Prerequisites for entry onto the specific course
- Theoretical knowledge instruction syllabus and test summary
- Helicopter flight training courses
- Helicopter & FSTD flight training courses
- Skill test

9.2 Course pre-entry requirements

For the issue of a first type rating for a single-pilot multi-engine helicopter, all students must fulfil the pre-entry requirements of the Part –FCL.720.H(c).

9.3 Licensing requirements

The AMC2 FCL.725 (a) of the Part –FCL requires for an Initial issue of a:

- SPH, MET (H) CS and FAR 27 and 29, an approved flight instruction of at least **8** flight hours in the helicopter or when using:
 - FFS level C/D, at least 2 hours in helicopter and at least 10 hours in total excluding skill test.
 - FTD level 2 or 3, at least 4 hours in helicopter and at least 10 hours in total excluding skill test.
- MPH, MET (H) CS and FAR 27 and 29, an approved flight instruction of at least **10** flight hours in the helicopter or when using:
 - FFS level C/D, at least 2 hours in helicopter and at least 12 hours in total excluding skill test.
 - FTD level 2 or 3, at least 4 hours in helicopter and at least 12 hours in total excluding skill test.(See Appendix 2).

Note:

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

- *complexity of the aircraft type, handling characteristics, level of technology*
- *previous experience of the applicant*
- *the availability and level of FSTDs*

9.4 Initial & Additional Type Rating training courses

9.4.1 Initial Type Rating (ITR)

Candidates for the Initial single-pilot AB/AW139 Type Rating shall, before starting flight training:

- Hold a valid Helicopter Pilot license,
- Hold a Single-Engine Piston / Turbine Pilot Type Rating
- have passed the ATPL(H) theoretical knowledge examinations; or
- hold a certificate of completion of a pre-entry course conducted by an ATO. The course shall cover the following subjects of the ATPL(H) theoretical knowledge course:
 - Aircraft General Knowledge: airframe/systems/power plant, and instrument/electronics,
 - Flight Performance and Planning: mass and balance, performance;
- in the case of applicants who have not completed an ATP(H)/IR, ATP(H), or CPL(H)/IR integrated training course, have completed at least 70 hours as PIC on helicopters.

Candidates for the initial multi pilot AB/AW139 Type Rating shall, before starting flight training:

- have at least 70 hours as PIC on helicopters;
- except when the type rating course is combined with an MCC course:
 - hold a certificate of satisfactory completion of an MCC course in helicopters; or
 - have at least 500 hours as a pilot on multi-pilot aeroplanes; or
 - have at least 500 hours as a pilot in multi-pilot operations on multi-engine helicopters;
- have passed the ATPL(H) theoretical knowledge examinations.

9.4.2 Additional Type Rating (ATR)

Candidates for an Additional AB/AW139 Type Rating shall:

- 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.

9.5 Initial & Additional Type rating training minimum syllabus summary

The tables below summarise the minimum training hours required for VFR and IR for an Initial (ITR) and Additional (ATR) Type rating courses in Single Pilot (SP) and Multi Pilot (MP) crew. Table 1 shows training courses on helicopter only while Table 2 shows Training courses including Helicopter and FSTD's.

9.5.1 Helicopter only

VFR / IR courses : Helicopter only						
	Initial Type Rating (ITR)				Additional Type Rating (ATR)	
	Single Pilot		Multi Pilot		Single Pilot or Multi Pilot	
	VFR	IR	VFR	IR	VFR	IR
Theoretical course (incl. theoretical exam)	60h00	-	60H00	-	60H00	-
Helicopter	8h00	6h00	10h00	6h00	5h00	4h00
+ Skill test	required	required	required	required	required	required

Table 1

9.5.2 Helicopter & FSTD's

VFR / IR courses : Helicopter & FSTD's								
	Initial Type Rating (ITR)				Additional Type Rating (ATR)			
	Single Pilot or Multi Pilot				Single Pilot or Multi Pilot			
	VFR		IR		VFR		IR	
Theoretical course (incl. theoretical exam)	60h00		-		60h00		-	
FTD Level 2	10h00	-	8h00	-	6h00	-	6h00	-
FFS Level D	-	12h00	-	8h00	-	8h00	-	6h00
Helicopter	5h00	2h00	2h00	2h00	4h00	2h00	-	-
+ Skill test	Required on helicopter	Required on helicopter	Required on helicopter	Required on FFS or helicopter	Required on helicopter	Required on helicopter	Required on helicopter	Required on FFS or helicopter

Table 2

9.6 Theoretical knowledge syllabus and test summary

9.6.1 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 or an 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	AB/AW 139
Helicopter structure, transmissions, rotors and equipment, normal and abnormal operation of the systems	34h00
Limitations (**)	2h30
Performance, flight planning and monitoring (**)	2h00
Weight and balance, servicing	3h00
Emergency procedures (**)	5h00
Special requirements for helicopters fitted with electronic flight instrument systems or equivalent equipment, Systems Integration and Display, Navigation, FMS ; when applicable	12h00
Optional equipment	In addition
TOTAL THEORETICAL KNOWLEDGE SYLLABUS	58h30
Theoretical examination session	1h30
TOTAL	60h00

Table 3

*(**) 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.

9.7 Flight training course summary (VFR)

9.7.1 Initial & Additional Type Rating: Helicopter only

Initial & Additional Type Rating - <u>Helicopter only</u>			
	Initial (ITR)		Additional (ITR)
	Single Pilot	Multi Pilot	Single Pilot or Multi Pilot
Pre-flight, cockpit, engine start, Shut down, Basic air work, General Handling, Various touch-downs	1h15	1h15	1h15
Circuits and Various touch-downs.	1h15	1h15	-
Systems Integration and Display, Navigation, FMS, System Malfunction, Emergency procedures.	1h15	1h15	1h15
Systems Integration and Display, Navigation, FMS, System Malfunction, Emergency procedures.	-	1h00	-
Abnormal and Emergency Procedures.	1h15	1h15	1h00
Simulated Engine failure, Hydraulic failure, Manual Control of engine power, Straight in Autorotation	1h30	1h30	-
Various Autorotations Clear Area CAT "A" take-off and landing AEO and OEI training procedures, CAT "B" profiles	1h30	1h30	1h30
Clear Area CAT "A" take-off and landing AEO and OEI training procedures, CAT "B" profiles	-	1h00	-
Total Flight Training	8h00	10h00	5h00
Skill Test <i>In accordance with Part FCL Appendix 9</i>	Required	Required	Required

Table 4

Notes applicable for both Tables 4 and 5 :

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

The flight training course corresponds to the basic aircraft certification and satisfies the conditions of Part FCL –Section H, taking into account the type of license held and the experience of the candidate.

Each helicopter flight session could be extended or reduced by 15 minutes 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.

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

9.7.2 Initial & Additional Type Rating: Helicopter & FSTD's

Initial & Additional Type Rating - <u>Helicopter & FSTD's</u>								
	Initial (ITR)				Additional (ITR)			
	Single Pilot or Multi Pilot				Single Pilot or Multi Pilot			
	FTD "2" + Helicopter		FFS "D"+ Helicopter		FTD "2" + Helicopter		FFS "D" + Helicopter	
	FTD	Hel.	FFS	Hel.	FTD	Hel.	FFS	Hel.
Pre-flight and cockpit inspection (ground only)	As applicable							
Engine start, Shut down, Basic air work, General Handling, Various touch-downs	1h30	-	1h30	-	1h15	-	1h15	-
Circuits and Various touch-downs.	-	-	1h00	-	-	-	-	-
Circuits and Various touch-downs.	1h00	1h00	1h00	-	-	1h15	1h15	-
Systems Integration and Display, Navigation, FMS, System Malfunction, Emergency procedures.	1h15	-	1h15	-	1h15	-	1h15	-
Systems Integration and Display, Navigation, FMS, System Malfunction, Emergency procedures.	1h15	-	1h15	-	-	-	-	-
Abnormal and Emergency Procedures.	1h15	-	1h30	-	-	-	-	-
Abnormal and Emergency Procedures.	1h15	-	1h30	-	1h00	-	1h15	-
Simulated Engine failure, Hydraulic failure, Manual Control of engine power, Straight in Autorotation	1h30	1h15	1h30	1h00	1h15	1h15	1h30	1h00
Various Autorotations Clear Area CAT "A" take-off and landing AEO and OEI training procedures, CAT "B" profiles	1h30	1h15	1h30	1h00	1h15	1h15	1h30	1h00
Clear Area CAT "A" take-off and landing AEO and OEI training procedures, CAT "B" profiles	-	1h15	-	-	-	-	-	-
FSTD's & Helicopter dedicated Flight Training	10h00	5h00	12h00	2h00	6h00	4h00	8h00	2h00
Total Flight Training	15h00		14h00		10h00		10h00	
Skill Test <i>In accordance with Part FCL Appendix 9</i>	Required		Required		Required		Required	

Table 5

9.7.3 CAT A Training procedures

For operations in hostile and congested environment (ref. JAR OPS 3) CAT A profiles have to be taught. Based on previous experience of the applicant, this CAT “A” session can either be included in the standard training or in addition for Single and Multi pilot crew as followed:

Initial & Additional VFR Type Rating (ITR) - Cat A profiles			
Helicopter & Flight Simulator	FFS	Helicopter	FFS + Helicopter
All CAT A take-off and landing AEO and OEI training procedures.	6h00	-	6h00
	4h00	2h00	6h00
	-	5h00	5h00
Skill Test	As required	As required	As required

Table 6

9.8 Instrument Rating Extension Courses (IR) :

IR Extension Courses						
	Initial Type Rating (ITR)			Additional Type Rating (ATR)		
	Single Pilot or Multi Pilot			Single Pilot or Multi Pilot		
	Helicopter Only	Helicopter & FSTD's		Helicopter Only	Helicopter & FSTD's	
FTD Level 2	-	8h00	-	-	6h00	-
FFS Level D	-	-	8h00	-	-	6h00
Helicopter (H)	6h00	2h00	2h00	4h00	-	-
+ Skill test	Required On helicopter	Required On helicopter	Required on FFS or helicopter	Required On helicopter	Required On helicopter	Required on FFS or helicopter

Table 7

10. Training Area of Special Emphasis (TASE)

10.1 General

The following procedures for training should receive special attention. Since, although they relate to separate issues, they are inter-connected.

Therefore the OEB supports the manufacturer recommendations and training providers should consider the following elements:

The OEB has identified several helicopter systems and/or procedures should receive specific attention in the AB/AW 139 type rating courses:

- Flight Management System (FMS),
- Automatic Flight Control System (AFCS),
- Multi-function display (MFD) and Crew Alerting System (CAS),
- reversion modes of the EEC controlled engines
- use of Power Index (PI)

In addition, the AB/AW 139 should be emphasized throughout the training programs with regards to the high level of automation in this helicopter. Also due to the fact, that this aircraft can be operated either in Single pilot or in Multi pilot operations, Crew coordination and proper flight management (CRM) should be reinforced to cover both operational issues.

10.1.1 Four Axis basic Flight Director

The 4-axis Flight Director (FD) provides commands that are coupled to the autopilot (AP) for automatic flight path control around the three axis (pitch, roll, yaw) plus collective.

The 4-axis Flight Director can work in coupled or in uncoupled mode depending on crew selection. Two different versions of 4-axis FD (Basic and Enhanced) are currently certified for the AB/AW139 in the following configurations:

- Basic Flight Director:
 - (RFM Supplement # 40);
 - with EPIC software Phase 5 (RFM Supplement # 70)
- Enhanced Flight Director :
 - (RFM Supplement # 34)
 - with EPIC software Phase 5 (RFM Supplement # 67)
 - with EPIC software Phase 5 including SAR modes (RFM Supplement # 69)

NOTE: the PRIMUS EPIC[®] system is an integrated system that includes the following sub-systems necessary to operate the helicopter: auto-flight, communications, indicating and recording, navigation and central maintenance. The system can also integrate the communications and navigation systems with other sub-systems of the helicopter.

Lateral and vertical navigation plus approach modes are available for the Basic 4-axis FD while in the Enhanced 4-axis FD the automatic hovering function is also provided.

The following modes are available: HDG, ALT, IAS, ALTA, NAV, APP (this modes allows ILS/VOR CAT 1 approaches up to 7.5 deg and FMS approaches as well), PRV (preview mode), DCL (deceleration during ILS), BC, VS, GA, OS (over station mode), ALVL, RHT, HOV (only in the 4-axis Enhanced).

When any mode is engaged through the guidance controller panel located on the central consol, the FD shows the selected mode, the axis used for controlling the helicopter flight path and the navigation source on the PFD of the pilot in command. The same data are also presented on the PFD of the pilot non in command. Navigation source and helicopter position are also presented on the MFD on the MAP page.

A number of safety features have been introduced in the system to protect the aircraft from drifting from the selected altitude and to alert the crew through dedicated aural and visual warnings. Also the power used by the collective axis is limited by a PI (Power Index) limiting function that has been developed taking into account both AEO and OEI conditions.

The OEB also found that early exposure to the interaction of AFCS and FMS is important, especially for pilots with no or limited previous FMS experience. Establishing early confidence in manually flying the aircraft and FMS automatic flight mode, is equally important due to heavy reliance on the AFCS.

10.2 Category A and Training mode

Based on previous experience of the applicant, CAT "A" procedures and Training Mode need specific attention from student:

CAT "A"

The AgustaWestland AB/ AW 139 Category "A" operations include different profiles: see RFM Supplement 12 for details.

Category A operations can be conducted in the same take off and landing envelope applicable to Category B (14000 ft Hd or Hp, whichever comes first).

The minimum size of the heliport/helideck for which approval was granted is 15 by 15 meters.

Training Mode

The Category "A" training function has been designed to allow flight crew to familiarise with engine failure during Category "A" take off and landings without switching one engine to IDLE.

The main characteristic of the system is the use of both engines power during the simulated OEI phase. This avoids use of the engine OEI 2,5 minutes rating.

The maximum power deliverable by the two engines running during the OEI simulated phase is limited to 140% PI (approximately 70% per engine), instead of 160% PI of the real OEI case; the maximum weight to be used for the training is reduced accordingly.

The training function is activated by a dedicated switch located on the ENG MODE panel. Through this switch the crew can select which engine will be simulated in failure conditions.

It is to be noted that when the training mode is used on the pilot and co-pilot PFD' s the PI is simulating an engine failure (in other words is not showing the power delivered by each engine but the total power delivered by the two engines is artificially attributed to the "live" engine). On the MFD' s the actual engine parameters are shown so to allow the crew to monitor engines and detect malfunctions.

Close attention was paid by ENAC that the information essential for the safety of flight was always displayed and available during a training session and not impaired by the simulation. From this point of view it has been required by ENAC that cautions, warnings and aural messages related to engine failures are not generated during Category "A" training sessions unless there is a real failure.

RFM

Category “A” operations are dealt by through a dedicated Supplement (Supplement no. 12) to the RFM applicable to the 4-display configuration (doc. 13G0290X002). This Supplement also includes instructions and procedures for Category “A” training.

Some changes have been also introduced in the basic sections of the RFM as a result of the system review performed to account for Category “A” requirements.

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

11.1 Skill test

As required by Part-FCL Appendix 9

11.2 Proficiency Checks

As required by Part-FCL Appendix 9

11.3 Currency

If the Type Rating is expired by more than two years, OEB recommends a refresher training including at least 8 hours ground course and 2 hours flight training in the Simulator and/or helicopter before the Proficiency Check.

11.4 Recent Experience

Recent experience as required by Part-FCL and JAR-OPS 3.

12. Specification for LIFUS (Line Flying Under Supervision)

As required by JAR-OPS 3.

13. Specification for Flight Simulation Training Devices

13.1 Full Flight Simulator

The evaluation of Flight Simulator took place from December 4th to December 7th, 2006 at AgustaWestland TRTO covering the following items:

The final report contains the following items:

- flight simulation training devices
- evaluation detail
- supplementary information

- training, testing and checking considerations
- classification of items
- results (See Appendix 9).

13.2 Flight Training Device

The evaluation of Flight Training device FTD took place on 30th March 2012 at AgustaWestland Training Academy covering the following items:

The final report contains the following items:

- flight simulation training device characteristics
- evaluation details
- supplementary information
- training, testing and checking considerations
- classification of items
- results (See Appendix 8).

14. 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.

15. Appendices

Appendix	0:	Cover
Appendix	1:	EASA TCDS.N°R006
Appendix	2:	Part FCL Type Rating Requirements
Appendix	3:	VFR & IR Type Training Syllabus - Helicopter only (Course AWTA.JT8 Issue D Rev. 2)
Appendix	4:	VFR & IR Type Training Syllabus - Helicopter and FSTD's (Course AWTA.JT9 Issue D Rev. 4)
Appendix	5:	Compliance Check List with JAR-OPS 3 Subpart K&L (Issue F)
Appendix	6:	Cat. A Training Module (Course AWTA.E2 Issue D)
Appendix	7:	MMEL (Revision F)
Appendix	8:	FTD Qualification Certificate
Appendix	9:	FFS Qualification Certificate
Appendix	10:	Single Pilot IFR/VFR Night workload assessment

Notes:

- *Appendices are available for NAA's by request to EASA Expert Department / Certification Directorate or to AgustaWestland Manufacturer.*
- *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. However regarding Appendices, latest approval and up dated documents can be provided by manufacturer based on the date of the request.*