OPERATIONAL SUITABILITY DATA (OSD)

Flight Crew

LEONARDO S.P.A.

AW189

REVISION 1 – MAY 2025

Revision Control

REVISION	DATE	HIGHLIGHTS OF CHANGE
Original	August 14, 2015	Original report.
1	MAY 8, 2025	Addition of CAT A operations information; editorial changes.

Approval

Mario Igawa

Manager, Aeronautical Product Design Certification Branch
Department of Airworthiness

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Acronyms

- AEO – All Engines Operating
- AFCS – Automatic Flight Control System
- AMLCD – Active Matrix Liquid Crystal Displays
- ANAC – Agência Nacional de Aviação Civil (Brazilian National Civil Aviation Agency)
- APU – Auxiliary Power Unit
- ATO – Approved Training Organizations
- ATPL(H) – Airline Transport Pilot's Licence (Helicopter)
- ATR – Additional Type Rating
- CAS – Crew Alerting System
- CBT – Computer Based Training
- CRM – Crew Resource Management
- DME – Distance Measuring Equipment
- DR – Differences Requirements
- EASA – European Aviation Safety Agency
- ECDU – Electronic Control & Display Units
- EFIS – Electronic Flight Instrument System
- FFS – Full Flight Simulator
- FMS – Flight Management System
- FNPT – Flight and Navigation Procedures Trainer
- FSTD – Flight Simulator Training Device
- FTD – Flight Training Device
- F/D – Flight Director
- GPS – Global Positioning System
- IFR – Instrument Flight Rules
- IR – Instrument Rating
- IS – Instrução Suplementar (Supplementary Instruction)
- ITR - Initial Type Rating
- MCC – Multi Crew Coordination
- MDR – Master Difference Requirements
- MEL – Minimum Equipment List
- MET – Multi Engine Turbine
- MFD – Multi Function Flight Display
- MMEL – Master Minimum Equipment List
- MP – Multi Pilot
- N/A – Not Applicable
- ODR – Operational Difference Requirements
- OEB – Operational Evaluation Board

- OEI – One Engine Inoperative
- OTD – Other Training Device
- PF – Pilot Flying
- PFD – Primary Flight Display
- PIC – Pilot in Command
- PNF – Pilot not flying
- QRH – Quick Reference Handbook
- RBAC – Regulamento Brasileiro de Aviação Civil
- SAR – Search and Rescue
- SP – Single Pilot
- SVS – Synthetic Vision System
- TAWS – Terrain Awareness and Warning System
- TCAS – Traffic Collision and Avoidance System
- VIPT – Virtual Interactive Procedural Trainer
- VFR – Visual Flight Rules
- VOR – Very High Frequency Omnidirectional Range

1 Introduction

1.1 Background

For original revision, the evaluation was conducted by documental analysis using the information provided by the manufacturer and the determinations of the OEB Report, in its final report revision, issued by EASA on May 5th, 2015.

For this revision 1, the information regarding CAT A operation obtained from Leonardo AW189 OSD Flight Crew Data (189G0000N017 ISSUE F with EASA Approval Number 10081729 on Apr 18th, 2023) was included.

In case more detailed information is required, refer to the EASA OSD-FC Report mentioned above.

1.2 Objective

This report presents ANAC collection of results obtained from the operational evaluations of Leonardo model AW189.

1.3 Purpose

The purpose of this report is to:

a. Define the pilot type rating assigned for the AW189 helicopter;

b. Define the requirements for training, checking and currency applicable to flight crew for the AW189, and functionalities;

c. Provide the Master Differences Requirements (MDR) for crews requiring differences qualification for mixed-fleet-flying;

d. Provide Differences Requirements (DR); and

e. Describe the required Flight Simulation Training Device (FSTD) for crew training and checking.

1.4 Applicability

This report is applicable to:

- ANAC employees who approve training programs;
- ANAC employees and designees who certify airmen; and
- Aircraft operators and training providers certified / approved under Brazilian requirements to assist them in developing their flightcrew member training, checking, and currency.

1.5 Cancelation

Not applicable.

2 Pilot Type Rating

The pilot type rating assigned to model AW189 is designated "**A189**".

Table 1 - Pilot Type Rating

Fabricante *(Manufacturer)*	**Aeronave** *(Aircraft)*		**Observações** *(Remarks)*	**Designativo** *(Designative)*
	Modelo *(Model)*	**Nome** *(Name)*		
Leonardo S.p.A.	AW189	-	Relatório de FCD Leonardo AW189 *ANAC OSD-FC Report Leonardo AW189*	A189

3 Master Difference Requirements (MDR)

The Master Difference Requirements matrix for AW139 and AW189 is shown in Table 2. These provisions are applied when there are differences between models which affect crew knowledge, skills, or abilities related to flight safety (e.g., Level A or greater differences) for training, checking and currency, respectively, according to IS 21.61-001.

Table 2 - Master Difference Requirements

		From Helicopter	
		AW139	**AW189**
To Helicopter	**AW139**	N/A	E/E/E
	AW189	E/E/E	N/A

4 Operator Difference Requirements (ODR)

Each operator of a mixed fleet of AW139 and AW189 shall produce its own ODR, as required by IS 21.61-001.

For operators flying the AW139 and AW189 helicopters, the DR tables are available in Appendix 1 and may be used for approval of an operator with the specific aircraft configuration.

5 Specifications for Training, Checking and Currency

Specifications for training, checking and currency are detailed in EASA OSD-FC Report mentioned above.

5.1 Airmen Minimum Experience for Flight Training

All candidates must fulfil the requirements of RBAC 61 for the issue of type rating and those specific for the issue of an initial multi-engine, single or multi-pilot helicopter.

The ANAC recommends the training organizations to distribute a list of the acronyms of systems of the AW189 and a cockpit layout timely before the start of the course to enable candidates for the AW189 type rating to become familiar with those acronyms and the location of systems in the cockpit.

Due to the complexity of the helicopter systems, ANAC also recommends during the theoretical training phase additional sessions in OTD, like a VIPT or similar devices to get practical knowledge, to better assimilate the complexity of systems more easily in particular FMS, EFIS environment, TCAS and TAWS.

5.1.1 Initial and Additional Type Rating

AW189 Type Rating Courses are divided into two different training patterns:

- Initial Type Rating Courses (ITR) are aimed to applicants for whom the AW189 is the first Type Rating on a Multi-Engine Turbine (MET) helicopter.
- Additional Type Rating courses (ATR) are aimed to candidates who already have a Type Rating on a Multi-Engine Turbine helicopter or in multi-pilot operations and require the issuance of an additional Type Rating.

Initial Type Rating (ITR)

- Candidates for the Initial single-pilot AW189 Type Rating must:
  - Hold a valid Helicopter Pilot license,
  - Hold a type rating of a single-engine piston or turbine helicopter
  - Comply with the requirements set out in RBAC 61 subpart K
  - Have 70 Flight Hours as PIC
  - Hold a Multi Engines Turbine pre-entry course.

- Candidates for the initial multi pilot AW189 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 aero planes; 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.

Additional Type Rating (ATR)

- Candidates for an Additional AW189 Type Rating must:
    - Hold a valid Pilot license,
    - Hold a Helicopter Multi-Engine Turbine Pilot Type Rating
    - Comply with the requirements set out in RBAC 61 subpart K.

Credits for training between AW139 and AW189

For AW139 type rated pilots a reduced Additional Type Rating courses may be applied.

5.2 Initial and 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 and also AgustaWestland AW189 both tables included the Additional Type Rating based on commonalities between the AW139 and the AW139 helicopters for pilot who already hold an AW139 type rating.

5.2.1 Single Pilot Type Rating training minimum syllabus

Table 3

Single Pilot Type Rating Training Course							
		Theoretical Instruction	Training in FSTD			Training in Helicopter	Skill Test In addition
			OTD/VIPT	FTD	FFS		
ITR	VFR	62.5 h (including 2.5h theoretical exam) + 3 VIPT(1) sessions	1 session	12h	-	4h	Hel
			1 session	-	12h	2h	FFS or Hel
			1 session	-	-	12h	Helicopter
	IR	-	-	10h	-	2h	FFS or Hel
			-	-	8h	2h	FFS or Hel
			-	-	-	10h	Hel
ATR	VFR	62.5 h (including 2.5h theoretical exam) + 3 VIPT(1) sessions	1 session	8h	-	4h	Hel
			1 session	-	8h	2h	FFS or Hel
			1 session	-	-	8h	Hel
	IR	-	-	6h	-	-	FFS or Hel
			-	-	6h	-	FFS or Hel
			-	-	-	6h	Hel
ATR For AW 139 Type Rating holder	VFR	62.5 h (including 2.5h theoretical exam) + 3 VIPT(1) sessions	1 session	6h	-	2h	Hel
			1 session	-	6h	1h	FFS or Hel
			1 session	-	-	5h	Hel
	IR	-	-	4h	-	-	FFS or Hel
			-	-	4h	-	FFS or Hel
			-	-	-	4h	Hel

(1) Each VIPT session will take between 2 to 3 hours.

5.2.2 Multi Pilot Type rating training minimum syllabus

Table 4

Multi- Pilot Type Rating Training Course							
		Theoretical Instruction	Training in FSTD			Training in Helicopter	Skill Test In addition
			OTD/VIPT	FTD	FFS		
ITR	VFR	62.5 h (including 2.5h theoretical exam) + 3 VIPT(1) sessions	1 session	12h PF + PNF*	-	4h PF	Hel
			1 session	-	12h PF + PNF*	2h PF	FFS or Hel
			1 session	-	-	12h PF	Hel
	IR	-	-	10h PF + PNF*	-	2h PF	Hel
			-	-	8h PF + PNF*	2h PF	FFS or Hel
			-	-	-	10h PF	Hel
ATR	VFR	62.5 h (including 2.5h theoretical exam) + 3 VIPT(1) sessions	1 session	8h PF + PNF*	-	4h PF	Hel
			1 session	-	8h PF + PNF*	2h PF	FFS or Hel
			1 session	-	-	8h PF	Hel
	IR	-	-	6h PF + PNF*	-	-	Hel
			-	-	6h PF + PNF*	-	FFS or Hel
			-	-	-	6h PF	Hel
ATR For AW 139 Type Rating holder	VFR	62.5 h (including 2.5h theoretical exam) + 3 VIPT(1) sessions	1 session	6h PF + PNF*	-	2h PF	Hel
			1 session	-	6h PF + PNF*	1h PF	FFS or Hel
			1 session	-	-	5h PF	Hel
	IR	-	-	4h PF + PNF*	-	-	FFS or Hel
			-	-	4h PF + PNF*	-	FFS or Hel
			-	-	-	4h PF	Hel

*The Multi Pilot Training Course is designed to be attended by two flight crew members. One flight crew member will operate as PF and the other member as PNF during manoeuvres/procedures of the scheduled sortie in accordance with MCC.

(1) Each VIPT session will take between 2 to 3 hours.

5.3 Theoretical knowledge syllabus and test summary

5.3.1 Initial and Additional Type Rating

The following sections present a summary of the material for an Initial and additional Type Rating training program should consider. While 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.

Table 5

Initial and Additional Type Rating theoretical knowledge syllabus	AW189
Helicopter structure, transmissions, rotors and equipment, normal and abnormal operation of the systems	26h00
Limitations (*)	2h00
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, Communication, FMS.	22h00
Optional equipment	In addition
TOTAL THEORETICAL KNOWLEDGE SYLLABUS	60h00
Theoretical examination session	2h30
TOTAL	62h30
In addition 3 VIPT Sessions to consolidate the theoretical knowledge.	3 sessions

(*) 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 and a minimum of 100 questions is recommended covering the entire program either for Single or Multi pilot Training Course. 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.

The ANAC recommends due to the complexity of the systems of the AW189, especially displays and systems integration, to better understand their function, to integrate a training device (OTD) into the theoretical course. Those OTDs can be a VIPT, CBT, emulator and if those are not available, upper-level devices like FTD, FNPT, FFS or an equivalent way of cockpit training proposed by the training organizations, it could be also the aircraft. No credit towards flight training is given hereby.

As there is a strong evolution towards paperless courses, the applicant has to be well informed timely before the start of the course about the options on how to store, use and make notes on an electronic device. The options of either being offered a system, at least for the duration of the course by the training provider or that the applicant uses his own system as long as the system is easy to use, accessible and reliable.

The use of acronyms has become standard in system description and type-rating candidates have to be familiar with their meanings and use accordingly preferably before the start of the theoretical course.

5.4 Flight training course summary (VFR)

5.4.1 Initial & Additional Type Rating

Table 6

VFR Training Course	Initial Type Rating					Additional Type Rating				
Flight Simulation Training Device & Helicopter	**FFS +**	**Hel**	**FTD +**	**Hel**	**Hel only**	**FFS +**	**Hel**	**FTD +**	**Hel**	**Hel. only**
Pre-flight, cockpit (when applicable),, engine start, Shut down, Basic air work, General Handling, Various touch-downs	2h30	-	2h30	-	1h15	1h15	-	1h15	-	1h15
Circuits and Various touch-downs.	-	1h00	-	1h00	1h15	-	1h00	-	1h15	1h15
Automatic Flight Control System, Flight Management Computing System, Integration and Display System, Navigation, FMS, System Malfunction, Emergency procedures.	2h00	-	2h00	-	2h00	1h30	-	1h30	-	1h15
Automatic Flight Control System, Flight Management Computing System, Integration and Display System, Navigation, FMS, System Malfunction, Emergency procedures.	2h00	-	2h00	-	1h30	1h30	-	1h30	-	1h15
Abnormal and Emergency Procedures.	1h30	-	1h30	-	2h00	1h15	-	1h15	-	1h30
OEI failure, Hydraulic failure, Manual Control of engine power, Auto-rotations	2h00	-	2h00	1h00	1h30	1h15	-	1h15	1h15	-
Clear Area CAT "A" take-off and landing AEO and OEI training procedures, CAT "B" profiles	2h00	1h00	2h00	1h00	1h30	1h15	1h00	1h15	1h30	1h30
Clear Area CAT "A" take-off and landing AEO and OEI training procedures, CAT "B" profiles	-	-	-	1h00	1h00	-	-	-	-	-
Total Flight Simulation Training Device	**12h00**	**-**	**12h00**		**-**	**8h00**	**-**	**8h00**	**-**	-
Total Helicopter	**-**	**2h00**	**-**	**4h00**	**12h00**	**-**	**2h00**	**-**	**4h00**	**8h00**
Total Flight Training	**14h00**		**16h00**		**12h00**	**10h00**		**12h00**		**8h00**
Skill Test *In accordance with Part FCL Appendix 9*	Required		Required		Required	Required		Required		Required

5.4.2 Additional Type Rating for AW139 Type Rating holder

Table 7

VFR Training Course	Additional Type Rating for AW139 Type Rating holder				
Flight Simulation Training Device & Helicopter	**FFS**	**+ Hel**	**FTD**	**+ Hel**	**Hel. only**
Pre-flight, cockpit (when applicable),, engine start, Shut down, Basic air work, General Handling, Various touch-downs	1h00	-	1h00	-	1h00
Circuits and Various touch-downs.	-	-	-	1h00	1h00
Automatic Flight Control System, Flight Management Computing System, Integration and Display System, Navigation, FMS, System Malfunction, Emergency procedures.	1h30	-	1h30	-	1h00
Automatic Flight Control System, Flight Management Computing System, Integration and Display System, Navigation, FMS, System Malfunction, Emergency procedures.	1h30	-	1h30	-	-
Abnormal and Emergency Procedures.	1h00	-	1h00	-	1h00
OEI failure, Hydraulic failure, Manual Control of engine power, Autorotations	-	-	-	-	-
Clear Area CAT "A" take-off and landing AEO and OEI training procedures, CAT "B" profiles	1h00	1h00	1h00	1h00	1h00
Clear Area CAT "A" take-off and landing AEO and OEI training procedures, CAT "B" profiles	-	-	-	-	-
Total Flight Simulation Training Device	**6h00**	**-**	**6h00**	**-**	-
Total Helicopter	**-**	**1h00**	**-**	**2h00**	**5h00**
Total Flight Training	**7h00**		**8h00**		**5h00**
Skill Test *In accordance with Part FCL Appendix 9*	Required		Required		Required

Note:

In Table 6 and Table 7: During the flight "1", the Type Rating Instructor will evaluate the trainee level.

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).

Those Initial & Additional VFR Training Courses are recommended for both Single Pilot (SP) and Multi pilot (MP) Type Rating, however the Multi pilot is designed to be attended by two flight crew members. One flight crew member will operate as PF and the other member as PNF during manoeuvres/procedures of the scheduled sortie in accordance with MCC (See also Paragraph 5.2.2 Multi Pilot Type rating training minimum syllabus).

5.5 Training Area of Special Emphasis (TASE)

The training areas of special emphasis and findings listed in this report are based on a basic configuration of the AW189 model at the time of the report. The installation and use of future optional equipment and modifications may require additional evaluations and consequently introduce new findings and training areas of special emphasis.

The following procedures for training should receive special attention. Since, although they relate to separate issues, they are inter-connected. The TASE is a continuous process which is subject to updates throughout the helicopters further development for optional equipment and procedures and operational experience.

The ANAC has identified several helicopter systems and/or procedures should receive specific attention in the AW189 type rating courses and recommends the ATOs to put particular emphasis on the following and listed randomly and not as per importance:

- The ANAC recommend a review of all major aspects of CRM and CFIT prior or at least before the end of a training course is recommended by ANAC due to the highly integrated cockpit components. Selection and/or use of various systems such as TCAS, WX Radar, FMS, maps, reconfiguration options, SAR modes might need extra attention inside the cockpit and the reduced attention in flying the aircraft has to be coordinated.
- The use of acronyms has become standard in system description and type-rating and candidates have to be familiar with their meanings and use accordingly preferably before the start of the theoretical course.
- PFD attitude pitch markings and layout are larger than similar or previous types of helicopter PFD`s. Overcorrections could occur and special attention is needed during training to familiarize crews with those new pitch attitude indications.
- PFD positions are not similar placed on PFD 1 and PFD 2.
- VOR/FMS DME ranges are in different positions comparing PFD 1 and PFD 2;
- Double/Single function keys on the ECDU need special attention and training focus.

- Fuel system page has to be selected for visual queue, and fuel level and consumption should be monitored per operational task as fuel level indication is not obvious on the PFD.

- Not all CAS messages do refer to similar CAS messages in the QRH. Important is to well understand the relationship between the CAS messages and the references made in the QRH.

- Management of Electronic Control & Display Units (ECDU), including solid state breakers;

- Basel Key functionalities on PFD/MFD Active Matrix Liquid Crystal Displays (AMLCD).

- System Integration and Display.

- VFR/IFR approach and limitations.

- Terrain Awareness & Warning System (TAWS).

- Forward vertical visibility is reduced during landing and/or flare manoeuvres. A technique has to be acquired to re-establish vertical visibility by looking sideways or downwards via the side windows.

- During final stages of the landing maneuver increased pitch attitudes have to be monitored sharply versus limiting pitch attitudes to avoid tail strikes. For both single pilot and multi crew cockpit operations inside-outsides attitude crosschecks have to be accomplished.

- Technique to precisely control yaw movement has to be briefed and trained. Evaluation of the rudder pedals was announced by the trainers and test pilots as a small to medium pressure on one pedal at the time would not release the heading reference to yaw the helicopter. Increased pressure gives instantaneous but relative abrupt and no precise movement in yaw.

- Several techniques are available for CAT B take-off procedures. Special attention was given to pitch attitudes and power selection during the maneuver. Sideways movement of the helicopter during initial take-off segment seemed to be a consequence of lateral instability and has to be corrected positively during the take-off trajectory. Techniques are meant to be: Using trim release, trimming the attitude with the cyclic trim.

- Thorough knowledge of the AFCS and FMS system is highly recommended. Well trained crews can interact fast and easily with this integrated system for the selection of radio and navigation frequencies, performance management, GPS functions, waypoint databases and flight planning. Contrarily, insufficient knowledge and/or improper use of its hard- and software might lead to confusion, preoccupation and loss of situational awareness.

- F/D upper modes and limitations; Guidelines and recommended best practices should be determinate and listed by manufacturer and operator. A thorough understanding of the various lateral and vertical modes and the ability to select and arm the modes during different phases of flight is essential. Knowledge of the integrated use of AFCS and FMS system is herein critical during AEO as well as during OEI operations.
- Crews converting from large or similar helicopters as well as crews new to this helicopter have to realize well the overall dimensions of the AW189.
- The pilots seat station is in a low position and the dimensions might seem to be smaller than they actually are as well as compared to other types of helicopter. Finally the advanced stabilization system of the AW189 doesn`t give the feeling to the flight crew on the real dimensions of the helicopter.
- Due to their peculiarity and complexity, specific training is necessary for Category A take-off and landing procedures.

The high level of automation in this helicopter should be emphasized. 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.

5.6 Training Area of Special Emphasis (TASE) between AW139 and AW189.

The following procedures for difference training between AW139 and AW189 Types should receive special attention:

- PFD attitude pitch markings and layout are larger than similar on AW139. Overcorrections could occur and special care is needed during training to familiarize crews with those new pitch attitude indications.
- Management of Electronic Control & Display Units (ECDU) and related systems (fuel, hydraulic, electrical, radios, etc.) and in particular the functionality of solid state breakers;
- Fuel system procedure in normal /abnormal condition;
- Electrical system procedure in normal and abnormal condition;

- Double/Single function keys on the ECDU need special consideration and training emphasis.
- Basel Key functionalities on PFD/MFD Active Matrix Liquid Crystal Displays (AMLCD).
- Integrated SVS System in PFD.
- System Integration and Display.
- Use of APU System, in normal /abnormal condition, limitations and malfunctions.
- Flight Director (F/D) upper modes and limitations needs a particular emphasis in the proper use of collective modes and related safety functions, mainly for those pilots flying AW139 Phase 4.
- Philosophy in using of AEO and OEI switches and related engine(s) limitations.
- Rotor droop threshold on PI scale.

6 Specific Recommended Training

Special events training to improve basic crew understanding and confidence regarding aircraft handling qualities, options and procedures as these relate to design characteristics and limitations may include the advance Cat. A training, covering all the different Cat. A profiles developed and available on the type;

6.1 Advanced Category A Training procedures.

For Operations in hostile and congested environment Category A profiles has to be taught. Based on previous experience of the applicant, these Category A sessions can either be included in the standard training or in addition as follows.

ADVANCED CATEGORY A TRAINING		
	Theory	FSTD or OTD
Recommended duration	2h	4h

7 Compliance to RBAC 91 and RBAC 135

No Compliance Checklists were provided by the manufacturer.

8 Technical Publications

8.1 Master Minimum Equipment List - MMEL

The AW189 MMEL approved by the EASA shall be used by Brazilian operators as a basis for developing their MEL. These documents are available at the EASA website, through the link https://easa.europa.eu/document-library/master-minimum-equipment-lists.

8.2 Rotorcraft Flight Manual - RFM

The AW189 RFM approved by GGCP/SAR shall be used by Brazilian operators as a basis for developing their Operator Rotorcraft Operations Manual.

Appendix 1

Differences Requir’ements (DR) Tables

In this guide, the base helicopter (AW139) is called “H” and another type of helicopter (AW189) which will be called “H1” (or variant 1, if applicable). Differences can be checked in one side only or in both sides based on manufacturer application, like it is shown in this sample:

- AW139 → AW189
- AW189 → AW139

Before requiring flight crew members to operate more than one type or variant, operators or manufacturers should first nominates a helicopter as the “Base helicopter” from which it is shown differences with the other(s) helicopter type(s) or variant(s), the “Difference helicopter” in terms of technology (systems), procedures, pilot handling and aircraft management. These differences, known as Operator Difference Requirements), preferably presented in tabular format, constitute part of justification for operating more than one type or variant and also basis for the associated differences/familiarization training for flight crew.

For each aircraft related to as **Difference helicopter** and a **Base helicopter** there are 3 specific DR tables:

- DR 1 : General
- DR 2 : Systems
- DR 3 : Maneuver

General: general description of helicopter (dimensions, weight, limitations…)

Systems: brief description of systems and subsystems classified according to the ATA 100 (2200) index.

Maneuver: described according to phase of flight (parking area, taxi, flight).

DIFFERENCES: identification of the relevant differences between the base aircraft and the difference aircraft. List of relevant differences for each manoeuvre between the base aircraft and the difference aircraft.

FLIGHT CHARACTERISTIC: impact on flight characteristics (performance and/or handling).

PROCEDURE CHANGE impact on procedures (Yes or No).

Terminology, definitions and acronyms used in the document

Base Helicopter: an helicopter or a group of helicopter, designated by an operator or/and a manufacturer and used as a reference to compare differences with other helicopter types / variants within an operator's fleet.

Helicopter variant: an helicopter, or a group of helicopter, with the same or closed characteristics but which have differences from a base helicopter requiring additional flight crew knowledge, skills, and or abilities that affect flight safety.

Maximum Passenger Seat Configuration (MPSC).

Maximum Continuous Power (MCP)

Maximum Take-Off Power (MTOP)

ACSGS: AC Start-Generation Subsystem

DCGS: DC Generation Subsystem

PFD: Primary Flight Displays

MFD: Multifunction Flight Displays

ISIS: Integrated Standby Instrument System

DCP: Display Control Panels

CCD: Cursor Control Devices

RCP: Reversion Control Panel

DDCP: Display Dimming Control Panel

MCL/MWL: Master Caution/Master Warning Lights

CCJ: Cursor Control Joystick

Base Helicopter: H / Difference Helicopter: H1

Table 8: DR - General

Base Helicopter: AW139 **Difference Helicopter:** AW189		Δ 1		**COMPLIANCE METHOD**		
General	Differences	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
Limitations	**<u>AW139 (H)</u>** Maximum Weight with internal load 6800 kg Maximum Weight with external load 6800 kg. See RFM for limitations. Minimum Gross Weight for Flight 4400 Kg. **V_{NE}** Power on: 167 Kts IAS range 1000 ft hp to .6000 ft hp. Power off/OEI: .Vne 20 Kts IAS range .1000 to .6000 ft hp Maximum Operating Altitude Takeoff and landing: 14000 ft Maximum operating altitude: 6096 m (20000 ft hp) Maximum sea level ambient air temperature for operations: ISA+35°C limited to 50°C Minimum ambient air temperature for operations: - 40 °C Engines power: Two Turboshaft (s) Pratt & Whitney Canada PW PT6C-67C AEO: Take off power 1680 shp, 100% (Nr 100%) AEO: Max cont. 1531 shp 100% (Nr 100%) OEI (emergency): 2.5 min 1872 shp, (Nr 100%) OEI (emergency): max cont. 1680 shp, (Nr 100%) TURBINE OUTLET TEMP. (TOT) All engines operative (AEO) Maximum continuous : 735°C Takeoff (5 min) range: 735 °C to 775 °C Maximum: 847 °C Transient 5 sec One engine inoperative (OEI) Maximum continuous : 775°C 2.5 min range: 736°C to 835 °C Maximum: 847 °C Transient 5 sec Transient (5 sec): 847 °C	Y	Y	A	A	A

Base Helicopter: **AW139** **Difference Helicopter:** **AW189**		Δ 1		**COMPLIANCE METHOD**		
General	Differences	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
	Starting (2 sec): 1000 °C GAS GENERATOR (N1) RPM NOTE:100% N1 corresponds to 38200 RPM. All engines operative (AEO) Continuous operation: from 55.1 to 100 % Maximum continuous: 100 % Takeoff range: 100.1 % to 102.4 % Maximum : 102.4 % Transient (5 sec): 107 % One engine inoperative (OEI) Continuous operation: 55.1 to 102.4 % Maximum continuous : 102.4% 2.5 minutes range: 102.5 to 106 % Maximum : 106 % Transient (5 sec): 107 % POWER TURBINE (N2) RPM NOTE: 100% N2 corresponds to 21000 RPM output shaft speed and to 21000 RPM power turbine speed. All engines operative (AEO) Minimum: 98 % Continuous operation: 98 to 101 % Takeoff and landing : 100 to 102% Maximum : 102% Transient (10 sec): 105 % One engine inoperative (OEI) Minimum: 90 % Continuous operation: 98 to 101% Takeoff and landing: 90 to 103% Maximum: 103% Transient (10 sec): 106% Engine oil max temperature 140 °C TRANSMISSION LIMITATIONS TORQUE (TRQ%) All engines operative (AEO) Maximum continuous : 100 % Transient (5 sec) : 121 % One engine inoperative (OEI) Maximum continuous : 140 % 2.5 min : 160 % Transient (5 sec): 176 % TRANSMISSION OIL TEMPERATURE					

Base Helicopter: AW139 Difference Helicopter: AW189	Δ 1			COMPLIANCE METHOD		
General	Differences	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
	Normal Operation from.1 to .110°C Maximum 110°C **AW189 (H1)** Maximum Weight with internal load 8.300 kg Maximum Weight with external load 8300 kg V_{NE} : Power on: 169kt Power off/OEI: 120/139 Kts IAS range 1000 to 10000 ft hp Maximum operating altitude: Takeoff and landing: 8000ft Maximum operating altitude: 10000 ft Maximum sea level ambient temperature ISA+40°C limited to 55°C Minimum ambient air temperature for operations: - 40° C Engine Power Two Turboshaft (s) General Electric GE CT7-2E1 AEO: Take off power 1983 shp, 100% (Nr 100%) AEO: Max cont. 1870 shp 100% (Nr 100%) OEI (emergency): 2,5 min 2104 shp, (Nr 100%) OEI (emergency): Max cont. 1983 shp, (Nr 100%) TURBINE OUTLET TEMP. (TOT) All engines operative (AEO) Maximum continuous : 942°C Takeoff (5 min) range: 943°C to 968°C Maximum: 874°C for 12 sec One engine inoperative (OEI) Maximum continuous: 968°C 2.5 min range: 969°C to 1078°C Maximum: 1081°C Transient (12 sec): 1081°C Starting: 963°C GAS GENERATOR (N1) RPM					

Base Helicopter: AW139 **Difference Helicopter: AW189**		∆ 1		**COMPLIANCE METHOD**		
General	Differences	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
	NOTE: 100% N1 corresponds to 45907 RPM. All engines operative (AEO) Continuous operation: 64.1 to 102.7% Maximum continuous: 102.7% Takeoff range: 0% to 102.7% Maximum: 103.2% Transient (12 sec): 103.2% One engine inoperative (OEI) Continuous operation: 64.1 to 102.7% Maximum continuous: 102.7% 2.5 minute range: from 102.8 to 105% Maximum: 105% Transient (.2,5 min): 105.0% POWER TURBINE (N2) RPM NOTE: 100% N2 corresponds to 21000 RPM output shaft speed and to 21000 RPM power turbine speed. All engines operative (AEO) Minimum: 100% Continuous operation: 100 to 104% Takeoff and landing: 100 to 104% Maximum: 104% Transient (12 sec): 105% One engine inoperative (OEI) Minimum: 90% Continuous operation: 100 to 104% Takeoff and landing: 90 to 104% Maximum: 105% Transient (12 sec): 105% Engine oil max temperature 150 °C TRANSMISSION LIMITATIONS TORQUE (TRQ%) All engines operative (AEO) Maximum continuous: 100% Transient (5 sec): 123% One engine inoperative (OEI) Maximum continuous: 135% 2 min range 136 to 155% Transient (5 sec): 171% MAIN TRANSMISSION LUBRICATION SYSTEM Oil temperature Maximum: 115°C MAIN TRANSMISSION LUBRICATION SYSTEM						

Base Helicopter: AW139 Difference Helicopter: AW189		Δ 1		COMPLIANCE METHOD		
General	Differences	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
	Oil temperature Maximum : 110 °C TRANSMISSION OIL TEMPERATURE Continuous Operation from 1 to 115 °C Maximum 115 °C					
Performance	**AW139(H)** Density altitude Engine power assurance check Hover ceiling Operations versus allowable wind Height-velocity diagram (single graph versus multiple graphs) Fly-Away manoeuvre Rate of climb (OEI) Noise characteristics **AW189(H1) Not Available** Density altitude Engine power assurance check Hover ceiling Operations versus allowable wind Height-velocity diagram (single graph versus multiple graphs) Fly-Away manoeuvre Rate of climb (OEI) Noise characteristics	Y	Y	B	B	B

Table 9: DR 2 - Systems

Base Helicopter: AW139 **Difference Helicopter: AW189**		Δ 1		**COMPLIANCE METHOD**		
Main System Description	Differences	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
Engine & MGB Oil cooling system	**AW139** MGB lubrication cooling unit located aft of the MGB cowling, with a fan driven by the tail rotor drive shaft, through two belts and pulleys. **AW189** MGB cooling unit located aft of the MGB cowling, with a fan driven by a dedicated drive shaft from the MGB	N	N	A	A	A
Fuel Systems	**AW139** Includes the following features: - Self Sealing - Crashworthy - Internal Auxiliary Fuel Tank (self sealing for military application) **AW189** Includes the following features: - Self Sealing - Crashworthy - Pressure Refueling - Internal Auxiliary Fuel Tank (self sealing for military application) - Provision for External Auxiliary Fuel Tank (self sealing for military application) - Capability to feed the APU engine	N	Y	A	A	A
Fuel Systems Indications						
Main Hydraulic Power System	**AW139** System that provides the main power generation and distribution to the flight control actuators. Two separate, independent and redundant circuits compose the Main Hydraulic Power System. Each circuit can be depressurized individually in case of malfunction or system check through a dedicated Hydraulic Control Panel located in the inter-seat console. The Main Hydraulic Power system is constituted of two independent circuits **AW189** System that provides the main power generation and distribution to the flight control actuators. Two separate, independent and redundant circuits compose the Main Hydraulic Power System. Each circuit can be depressurized individually in case of malfunction or system check through a dedicated Hydraulic Control Panel located in the inter-seat console. The Main Hydraulic Power system is constituted of two independent circuits	N	N	A	A	A

Base Helicopter: **AW139** **Difference Helicopter:** **AW189**	Δ 1			**COMPLIANCE METHOD**		
Air Conditioning System	**AW139** Basic helicopter ram air system with an additional controllable fan in cabin system, heating and cooling control (air conditioning kit). Air heating and ventilation system common for cabin and cockpit, with ducts routing, supplied by a unique fan fitted in engine air intake cowling. **AW189** Basic helicopter ram air system with an additional controllable fan in cabin system, heating and cooling control. Air heating and ventilation system common for cabin and cockpit, with ducts routing, supplied by a unique fan fitted in engine air intake cowling.	N	N	A	A	A
Warning Panel	**AW139** Crew Alert System **AW189** Crew Alert System	N	N	B	B	A
Flight display	**AW139** Full Glass Cockpit **AW189** Full Glass Cockpit	N	Y	D	C	B
Automatic Flight Control System	**AW139** Digital 4 axis AFCS **AW189** Digital 4 axis AFCS	N	Y	C	B	A
Drive System	**AW139** Provides the : - mechanical power transfer from engines to the rotors (MR and TR) at the required speed - mechanical power transfer to accessories driven by MGB at the required speed - transfer of the main rotor head loads to the structure - support to the main rotor controls sliding guides and servo actuators - freewheeling of the main rotors in case of engine stop or shutdown, maintaining all MGB accessories rotating - support of the rotor brake **AW189** Provides the : - mechanical power transfer from engines to the rotors (MR and TR) at the required speed - mechanical power transfer to accessories driven by MGB at the required speed - transfer of the main rotor head loads to the structure	N	N	B	B	A

Base Helicopter: **AW139** **Difference Helicopter:** **AW189**	Δ 1			**COMPLIANCE METHOD**		
	- support to the main rotor controls sliding guides and servo actuators - freewheeling of the main rotors in case of engine stop or shutdown, maintaining all MGB accessories rotating - support of the rotor brake					
Power System	**AW139** Two turbo-shaft engines Pratt & Whitney Canada P&W PT6C-67C **AW189** Two turbo-shaft engines General Electric GE CT7-2E1	Y	Y	C	B	A
APU	**AW139** Not applicable **AW189** Microturbo eAPU60H.	Y	Y	E	C	B
Flight Control System	**AW139** composed of three Main Rotor Actuators (MRA) and one Tail Rotor Actuator(TRA) The F/C Hydraulic System consist of the following main components: Power Control module (2 off) Mechanically Driven Hydraulic Pump (3 off) Electric Motor Driven Hydraulic Pump Main Rotor Actuator (3 off) The MRAs are also designed to operate satisfactorily following the failure of a single hydraulic system **AW189** composed of three Main Rotor Actuators (MRA) and one Tail Rotor Actuator(TRA) The F/C Hydraulic System consist of the following main components: Power Control module (2 off) Mechanically Driven Hydraulic Pump (3 off) Electric Motor Driven Hydraulic Pump Main Rotor Actuator (3 off) The MRAs are also designed to operate satisfactorily following the failure of a single hydraulic system	N	N	A	A	A
	AW139 A single tandem hydraulic servo actuator controls the helicopter tail rotor. The TRA is bolted via a flange to the tail rotor 90°-gearbox assembly. The tail rotor blade pitch is controlled through an extension rod that is attached to the servo piston rod. The TRA is controlled by mechanical input commands from the pilot's control pedals **AW189** A single tandem hydraulic servo actuator controls the helicopter tail rotor. The TRA is bolted via a flange to the tail rotor 90°-gearbox assembly. The tail rotor blade pitch is controlled through an extension rod that is attached to the servo piston rod. The TRA	N	N	A	A	A

Base Helicopter: AW139 Difference Helicopter: AW189		Δ 1		COMPLIANCE METHOD		
Tail Rotor Actuator	is controlled by mechanical input commands from the pilot's control pedals					
Auxiliary Hydraulic Power System	**AW139** Redundant hydraulic system provides hydraulic power to compensate the loss of the main power source and to also provide hydraulic power (limited) for flight controls pre-flight check prior to starting the aircraft's engines. **AW189** Redundant hydraulic system provides hydraulic power to compensate the loss of the main power source and to also provide hydraulic power (limited) for flight controls pre-flight check prior to starting the aircraft's engines.	N	N	A	A	A
Utility Hydraulc System.	**AW139** System dedicated to the Landing Gear operation **AW189** System dedicated to the Landing Gear operation.	N	N	A	A	A
Hydraulic System control and indication	**AW139** System dedicated to the monitoring and control of the Main, Auxiliary and Utility systems. All the parameters pressure temperature and the control of the systems are managed by the Avionics System via sensors indication and controls selection/position. **AW189** System dedicated to the monitoring and control of the Main, Auxiliary and Utility systems. All the parameters pressure temperature and the control of the systems are managed by the Avionics System via sensors indication and controls selection/position.	N	N	A	A	A
Wheels brake system	**AW139** The wheel brake system provides for progressive, differential dynamic braking of the main wheels and a parking brake function **AW189** The wheel brake system provides for progressive, differential dynamic braking of the main wheels and a parking brake function	N	N	A	A	A
Electrical Power Generation	**AW139** Engine Start may be performed either by Battery or with external DC generator. Manual Engine Start is also possible. **AW189** One special feature of this helicopter is that the EPGDS provides the ability to	Y	Y	E	C	B

Base Helicopter: **AW139** **Difference Helicopter:** **AW189**		Δ 1		**COMPLIANCE METHOD**		
	electrically start the main engines via the AC starter-generators. The baseline EGPDS is grouped into three defined Subsystems: - AC Start-Generation Subsystem (ACSGS); - DC Generation Subsystem (DCGS); - AC/DC Power Distribution and Control subsystem (AC/DC PDCS).					
Basic Avionics System	**AW139** VFR and IFR capable fully integrated avionic system with four 6.6" X 8.7" color Active matrix LCD and 4-axis AFCS. Cockpit Display System 2 Primary Flight displays (PFD) 2 Multifunction Flight displays (MFD) 1 Electronic Standby Instrument System (ESIS) 2 Display Control Panels (DCP) 1 Reversion Control Panel (RCP) 1 Display Dimming Control Panel (DDCP) 2 Master Caution/Master Warning Lights (MCL/MWL) 2 5-way switch on cyclic stick; Cursor Control Joystick (CCJ) **AW189** VFR and IFR capable fully integrated avionic system with four 10"X8" color Active matrix LCD and 4-axis AFCS. Cockpit Display System 2 Primary Flight displays (PFD) 2 Multifunction Flight displays (MFD) 1 integrated Standby Instrument System (ISIS) 2 Display Control Panels (DCP) 2 Cursor control Devices (CCD) 1 Reversion Control Panel (RCP) 1 Display Dimming Control Panel (DDCP) 2 Master Caution/Master Warning Lights (MCL/MWL) 2 5-way switch on cyclic stick; Cursor Control Joystick (CCJ)	Y	Y	E	C	C
Rotor Brake System	**AW139** is physically and functionally the same as the rotor brake that is fitted to the AW189 aircraft. **AW189** is physically and functionally the same as the rotor brake that is fitted to the AW139 aircraft.	N	N	A	A	A
Fire Detection	**AW139** The system includes fire detection based on wire detection concept for bay (Engine bay #1 and #2) over-temperatures both locally and evenly distributed	N	N	A	A	A

Base Helicopter: AW139 **Difference Helicopter: AW189**	Δ 1			**COMPLIANCE METHOD**		
	AW189 The system includes fire detection based on wire detection concept for bay (Engine bay #1 and #2 plus APU bay) over-temperatures both locally and evenly distributed.					
Fire Protection	**AW139** - 2 bottles for Engine #1 and #2 1 bottle for APU - Check Tee Valve - Discharge indicators **AW189** - 2 bottles for Engine #1 and #2 1 bottle for APU - Check Tee Valve - Discharge indicators	N	N	A	A	A
Parameters Indicators	**AW139** Digital indicators (NG , ITT, TQ, Engine oil temperature and pressure, Fuel pressure) **AW189** Digital indicators (NG , ITT, TQ, Engine oil temperature and pressure, Fuel pressure)	N	N	B	A	A
Recording Systems	**AW139** CVR/DVR **AW189** CVR/DVR	N	N	A	A	A
Navigation	**AW139** GPS/FMS equipped **AW189** GPS/FMS equipped	Y	Y	E	C	B
Electronic Flight Instruments System	**AW139** Full Glass Cockpit **AW189** Full Glass Cockpit	Y	Y	D	C	B
Helicopter Fuselage	**AW139** Length 13,53m - Width 2,25m - Height 3,57m **AW189** Length 14,62m - Width 2,55m - Height 4,04m	Y	Y	B	A	A
Main Rotor	**AW139** Fully Articulated Type Diameter : 13,8 m Number of blades: 5 **AW189** Fully Articulated Type Diameter : 14.60 m Number of blades: 5	Y	Y	B	A	A

Base Helicopter: **AW139** **Difference Helicopter:** **AW189**		Δ 1		**COMPLIANCE METHOD**		
Tail Rotor	**AW139** Fully Articulated Type Diameter : 2,7 m Number of blades: 4 **AW189** Fully Articulated Type Diameter : 2,90 m Number of blades: 4	Y	Y	A	A	A
Engine controls	**AW139** The EEC system permits the accurate control of the engine speed and protects the engine from over-speeding. The engine control system includes a manual back-up engine control system operated by push-pull cables. **AW189** The EEC system permits the accurate control of the engine speed and protects the engine from over-speeding: the system is electronically redundant.	N	N	B	A	A
Air Data Circuit	**AW139** Air data circuit with 2 pitots fitted on each side of the cockpit and static pressure ports embedded inside the pitot probes. **AW189** Air data circuit with 2 pitots fitted on each side of the cockpit and static pressure ports embedded inside the pitot probes.	N	N	A	A	A

Table 10: DR 3 – Manoeuvres

Base aircraft: AW139 **Difference aircraft: AW189**		Δ 1		**COMPLIANCE METHOD**		
Manoeuvres	Differences	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
Flight manoeuvres and procedures						
Take-offs (various profiles)	Same philosophy with different parameters	Y	Y	D	D	D
Sloping ground take-offs & landings	The same	N	N	A	A	A
Take-off at maximum take-off mass	Same philosophy with different parameters	Y	Y	C	B	B
Take off with engine failure before reaching TDP	Same philosophy with different parameters	Y	Y	E	E	E
Take off with engine failure after reaching TDP	Same philosophy with different parameters	Y	Y	E	E	E
Landings, various profiles	Same philosophy with different parameters	Y	Y	E	E	E
Go-around or landing following engine failure before LDP	Same philosophy with different parameters	Y	Y	E	E	E
Landing following engine failure after LDP	Same philosophy with different parameters	Y	Y	E	E	E

Base aircraft: AW139 **Difference aircraft: AW189**		Δ 1		**COMPLIANCE METHOD**		
Manoeuvres	Differences	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
Normal and abnormal operations of the following systems and procedures						
Power plant system failure	Same philosophy with different representation	Y	Y	E	E	E
Vehicle Management system	Same philosophy with different parameters	Y	Y	E	E	E
Comfort system failure (air conditioning, heating, ventilation)	The same	N	N	A	A	A
Pitot/static system	Same philosophy with different parameters	Y	Y	D	D	D
Electrical system	AC APU	Y	Y	E	E	E
Hydraulic system	The same	Y	Y	B	B	B
Flight Display-system	The same small changes	Y	Y	E	D	C
Anti- and de-icing system						
Auto Flight Control System	Same philosophy	Y	Y	E	E	C
Weather radar, Radio-Altimeter, Transponder, ACAS, T.CAS	Same philosophy	Y	Y	D	D	C

Navigation : Flight Management System	GPS or NADIR	Y	Y	E	D	D
Auxiliary power unit	APU	Y	Y	E	D	D

Abnormal and emergency procedures						
Smoke control and removal	The same	N	N	B	B	B
Single engine failures	Same philosophy with different parameters	Y	Y	E	E	D

Base aircraft: H **Difference aircraft: H1**	Δ 1			**COMPLIANCE METHOD**		
Manoeuvres	Differences	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
Instrument Flight Procedures (To be performed in IMC or simulated IMC)						
Instrument take-off	The same	N	Y	D	D	D
Engine failure during departure	The same	Y	Y	E	D	D
Holding procedures	The same	N	Y	D	D	D
ILS-approaches down to CAT 1decision height	The same	N	N	D	D	D
ILS-approaches manually, without flight director	The same	N	Y	D	D	D
ILS-approaches manually, with flight director	The same	N	Y	D	D	D
ILS-approaches with coupled autopilot	The same	N	Y	D	D	D
Non-precision approach		N	Y	D	D	D
Go-around with all engines operating	The same	N	N	D	D	D
Missed approach procedures	The same	Y	Y	D	D	D
Go-around with one engine inoperative	The same	Y	Y	D	D	D
IMC autorotation descent	The same	Y	Y	D	D	D
Recovery from unusual attitudes	The same	Y	Y	D	D	D

Base Helicopter: AW189 / Difference Helicopter: AW139

Table 11: DR 1 - General

Base Helicopter: **AW189** **Difference Helicopter:** **AW139**	∆ 2			**COMPLIANCE METHOD**		
General	Differences	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
Limitations	**AW189** Maximum Weight with internal load 8.300 kg Maximum Weight with external load 8300 kg V_{NE} : Power on: 169kt Power off/OEI: 120/139 Kts IAS range 1000 to 10000 ft hp Maximum operating altitude: Takeoff and landing: 8000ft Maximum operating altitude: 10000 ft Maximum sea level ambient temperature ISA+40°C limited to 55°C Minimum ambient air temperature for operations: - 40° C Engine Power Two Turboshaft (s) General Electric GE CT7-2E1 AEO: Take off power 1983 shp, 100% (Nr 100%) AEO: Max cont. 1870 shp 100% (Nr 100%) OEI (emergency): 2,5 min 2104 shp, (Nr 100%) OEI (emergency): Max cont. 1983 shp, (Nr 100%) TURBINE OUTLET TEMP. (TOT) All engines operative (AEO) Maximum continuous : 942°C Takeoff (5 min) range : 943°C to 968°C Maximum: 874°C for 12 sec One engine inoperative (OEI) Maximum continuous: 968°C 2.5 min range: 969°C to 1078°C Maximum: 1081°C Transient (12 sec): 1081°C Starting: 963°C GAS GENERATOR (N1) RPM NOTE: 100% N1 corresponds to 45907 RPM. All engines operative (AEO) Continuous operation: 64.1 to 102.7% Maximum continuous: 102.7% Takeoff range: 0% to 102.7% Maximum: 103.2% Transient (12 sec): 103.2% One engine inoperative (OEI) Continuous operation: 64.1 to 102.7% Maximum continuous: 102.7% 2.5 minute range: from 102.8 to 105% Maximum: 105%	Y	Y	A	A	A

Base Helicopter: **AW189** **Difference Helicopter:** **AW139**	∆ 2			**COMPLIANCE METHOD**		
General	Differences	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
	Transient (.2,5 min): 105.0% POWER TURBINE (N2) RPM NOTE: 100% N2 corresponds to 21000 RPM output shaft speed and to 21000 RPM power turbine speed. All engines operative (AEO) Minimum: 100% Continuous operation: 100 to 104% Takeoff and landing: 100 to 104% Maximum: 104% Transient (12 sec): 105% One engine inoperative (OEI) Minimum: 90% Continuous operation: 100 to 104% Takeoff and landing: 90 to 104% Maximum: 105% Transient (12 sec): .105% Engine oil max temperature150 °C TRANSMISSION LIMITATIONS TORQUE (TRQ%) All engines operative (AEO) Maximum continuous: 100% Transient (5 sec): 123% One engine inoperative (OEI) Maximum continuous: 135% 2 min range 136 to 155% Transient (5 sec): 171% MAIN TRANSMISSION LUBRICATION SYSTEM Oil temperature Maximum: 115°C MAIN TRANSMISSION LUBRICATION SYSTEM Oil temperature Maximum : 110 °C TRANSMISSION OIL TEMPERATURE Continuous Operation from 1 to 115 °C Maximum 115 °C **AW139** Maximum Weight with internal load 6400 kg Maximum Weight with external load 6800 kg. See RFM for limitations. Minimum Gross Weight for Flight 4400 Kg **V_{NE}** Power on: Kts 167 IAS range 1000 ft hp to 6000 ft hp. Power off/OEI: .Vne 20 Kts IAS range 1000 to 6000 ft hp Maximum Operating Altitude Takeoff and landing:14000 ft					

Base Helicopter: **AW189** **Difference Helicopter:** **AW139**		Δ 2		**COMPLIANCE METHOD**		
General	Differences	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
	Maximum operating altitude: 6096m(20000 ft hp) Maximum sea level ambient air temperature for operations: ISA+35°C limited to 50°C Minimum ambient air temperature for operations: - 40 °C Engines power: Two Turboshaft (s) Pratt & Whitney Canada PW PT6C-67C AEO: Take off power 1680 shp, 100% (Nr 100%) AEO: Max cont. 1531 shp 100% (Nr 100%) OEI (emergency): 2.5 min 1872 shp, (Nr 100%) OEI (emergency): max cont. 1680 shp, (Nr 100%) TURBINE OUTLET TEMP. (TOT) All engines operative (AEO) Maximum continuous : 735°C Takeoff (5 min) range : 735 °C to 775 °C Maximum: 847 °C Transient 5 sec One engine inoperative (OEI) Maximum continuous : 775°C 2.5 min range : 736°C to 835 °C Maximum : 847 °C Transient 5 sec Transient (5 sec) : 847 °C Starting (2 sec) : 1000 °C GAS GENERATOR (N1) RPM NOTE: 100% N1 corresponds to 38200 RPM. All engines operative (AEO) Continuous operation: from 55.1 to 100 % Maximum continuous : 100 % Takeoff range: 100.1 % to 102.4 % Maximum: 102.4% Transient (5 sec): 107% One engine inoperative (OEI) Continuous operation: 55.1 to 102.4% Maximum continuous : 102.4% 2.5 minutes range: 102.5 to 106% Maximum: 106% Transient (5 sec): 107% POWER TURBINE (N2) RPM NOTE: 100% N2 corresponds to 21000 RPM output shaft speed and to 21000 RPM power turbine speed. All engines operative (AEO) Minimum : 98 % Continuous operation: 98 to 101% Takeoff and landing: 100 to 102% Maximum : 102% Transient (10 sec): 105% One engine inoperative (OEI) Minimum: 90% Continuous operation: 98 to 101% Takeoff and landing: 90 to 103% Maximum: 103% Transient (10 sec): 106%					

Base Helicopter: **AW189** **Difference Helicopter:** **AW139**	Δ 2			**COMPLIANCE METHOD**		
General	Differences	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
	Engine oil max temperature 140 °C TRANSMISSION LIMITATIONS TORQUE (TRQ%) All engines operative (AEO) Maximum continuous : 100% Transient (5 sec): 121% One engine inoperative (OEI) Maximum continuous: 140% 2.5 min: 160 % Transient (5 sec): 176% TRANSMISSION OIL TEMPERATURE Normal Operationfrom 1 to 110 °C Maximum 110 °C					
Performance	**AW189 Not available** Density altitude Engine power assurance check Hover ceiling Operations versus allowable wind Height-velocity diagram (single graph versus multiple graphs) Fly-Away manoeuvre Rate of climb (OEI) Noise characteristics **AW139** Density altitude Engine power assurance check Hover ceiling Operations versus allowable wind Height-velocity diagram (single graph versus multiple graphs) Fly-Away manoeuvre Rate of climb (OEI) Noise characteristics	Y	Y	B	B	B
Weight & Balance	**AW189** Minimum Weight 5400 kg Maximum Weight with internal load = 8300.kg Max Longitudinal CG range from 5.029 m to 5.570 m Max Lateral CG range: 97 + 122 mm = 219 mm **AW139** Minimum Weight 4400 kg Maximum Weight with internal load = 6400 kg Max Longitudinal CG range 5 m (197 in) to 5.595 m (220 in) Max Lateral CG range: 88 + 120 mm = 208 mm	Y	N	A	A	A

Table 12: DR 2 – Systems

Base Helicopter: **AW189** **Difference Helicopter:** **AW139**	Δ 2			**COMPLIANCE METHOD**		
Main System Description	**Differences**	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
Engine & MGB Oil cooling system	**AW189** MGB cooling unit located aft of the MGB cowling, with a fan driven by a dedicated drive shaft from the MGB **AW139** MGB lubrication cooling unit located aft of the MGB cowling, with a fan driven by the tail rotor drive shaft, through two belts and pulleys.	N	N	A	A	A
Fuel Systems	**AW189** Includes the following features: Self Sealing - - Crashworthy - - - Pressure Refueling - - Internal Auxiliary Fuel Tank (self - - sealing for military application) - - Provision for External Auxiliary Fuel - - Tan (self sealing for military - - application) - - - Capabilit - y to feed the APU engine - **AW139** Includes the following features: - Self Sealing Crashworthy - - - Internal Auxiliary Fuel Tank (self - sealing for military application) -	N	Y	A	A	A
Fuel Systems indications						
Main Hydraulic Power System	**AW189** System that provides the main power generation and distribution to the flight control actuators. Two separate, independent and redundant circuits compose the Main Hydraulic Power System. Each circuit can be depressurized individually in case of malfunction or system check through a dedicated Hydraulic Control Panel located in the inter-seat console. The Main Hydraulic Power system is constituted of two independent circuits **AW139** System that provides the main power generation and distribution to the flight control actuators. Two separate, independent and redundant circuits compose the Main Hydraulic Power System. Each circuit can be depressurized	N	N	A	A	A

Base Helicopter: **AW189** **Difference Helicopter:** **AW139**	Δ 2			**COMPLIANCE METHOD**		
	individually in case of malfunction or system check through a dedicated Hydraulic Control Panel located in the inter-seat console. The Main Hydraulic Power system is constituted of two independent circuits					
Air Conditioning System	**AW189** Air heating and ventilation system common for cabin and cockpit, with ducts routing, supplied by a unique fan fitted in engine air intake cowling. **AW139** Air heating and ventilation system common for cabin and cockpit, with ducts routing, supplied by a unique fan fitted in engine air intake cowling.	N	N	A	A	A
Warning Panel	**AW189** Crew Alert System Conventional Caution & Warning Panel **AW139** Crew Alert System Conventional Caution & Warning Panel	Y	N	B	B	A
Flight display	**AW189** Full Glass Cockpit **AW139** Full Glass Cockpit	N	Y	C	B	A
Automatic Flight Control System	**AW189** Digital 4 axis AFCS **AW139** Digital 4 axis AFCS	N	N	C	B	A
Drive System	**AW189** Provides the : - mechanical power transfer from engines to the rotors (MR and TR) at the required speed - mechanical power transfer to accessories driven by MGB at the required speed - transfer of the main rotor head loads to the structure - support to the main rotor controls sliding guides and servo actuators - freewheeling of the main rotors in case of engine stop or shutdown, maintaining all MGB accessories rotating - support of the rotor brake **AW139** Provides the : - mechanical power transfer from engines to the rotors (MR and TR) at the required speed - mechanical power transfer to accessories driven by MGB at the required speed - transfer of the main rotor head loads to the structure - support to the main rotor controls sliding guides and servo actuators	N	N	B	B	A

Base Helicopter: AW189 **Difference Helicopter: AW139**	Δ 2			**COMPLIANCE METHOD**		
	- freewheeling of the main rotors in case of engine stop or shutdown, maintaining all MGB accessories rotating - support of the rotor brake					
Power System	**AW189** Two turbo-shaft engines General Electric GE CT7-2E1 **AW139** Two turbo-shaft engines Pratt & Whitney Canada P&W PT6C-67C	Y	Y	C	B	B
APU	**AW189** Microturbo eAPU60H. **AW139** Not applicable	Y	Y	A	A	A
Flight Control System	**AW189** Mechanical push and pull rods with servo-actuators composed of three Main Rotor Actuators (MRA) and one Tail Rotor Actuator(TRA) The F/C Hydraulic System consist of the following main components: Power Control module (2 off) Mechanically Driven Hydraulic Pump (3 off) Electric Motor Driven Hydraulic Pump Main Rotor Actuator (3 off) The MRAs are also designed to operate satisfactorily following the failure of a single hydraulic system **AW139** Mechanical push and pull rods with servo-actuators composed of three Main Rotor Actuators (MRA) and one Tail Rotor Actuator(TRA) The F/C Hydraulic System consist of the following main components: Power Control module (2 off) Mechanically Driven Hydraulic Pump (3 off) Electric Motor Driven Hydraulic Pump Main Rotor Actuator (3 off) The MRAs are also designed to operate satisfactorily following the failure of a single hydraulic system	N	N	A	A	A
Tail Rotor Actuator	**AW189** A single tandem hydraulic servo actuator controls the helicopter tail rotor. The TRA is bolted via a flange to the tail rotor 90°-gearbox assembly. The tail rotor blade pitch is controlled through an extension rod that is attached to the servo piston rod. The TRA is controlled by mechanical input commands from the pilot's control pedals **AW139** A single tandem hydraulic servo actuator controls the helicopter tail rotor. The TRA is bolted via a flange to the tail rotor 90°-gearbox assembly. The tail rotor blade pitch is controlled through an extension rod that is attached to the servo piston rod. The TRA is	N	N	A	A	A

Base Helicopter: **AW189** **Difference Helicopter:** **AW139**	Δ 2			**COMPLIANCE METHOD**		
	controlled by mechanical input commands from the pilot's control pedals					
Auxiliary Hydraulic Power System	**AW189** Redundant hydraulic system provides hydraulic power to compensate the loss of the main power source and to also provide hydraulic power (limited) for flight controls pre-flight check prior to starting the aircraft's engines. **AW139** Redundant hydraulic system provides hydraulic power to compensate the loss of the main power source and to also provide hydraulic power (limited) for flight controls pre-flight check prior to starting the aircraft's engines.	N	N	A	A	A
Utility Hydraulic System	**AW189** System dedicated to the Landing Gear operation. **AW139** System dedicated to the Landing Gear operation	N	N	A	A	A
Hydraulic System control and indication	**AW189** System dedicated to the monitoring and control of the Main, Auxiliary and Utility systems. All the parameters pressure temperature and the control of the systems are managed by the Avionics System via sensors indication and controls selection/position. **AW139** System dedicated to the monitoring and control of the Main, Auxiliary and Utility systems. All the parameters pressure temperature and the control of the systems are managed by the Avionics System via sensors indication and controls selection/position.	N	N	A	A	A
Wheels brake system	**AW189** The wheel brake system provides for progressive, differential dynamic braking of the main wheels and a parking brake function **AW139** The wheel brake system provides for progressive, differential dynamic braking of the main wheels and a parking brake function	N	N	A	A	A
Electrical Power Generation	**AW189** One special feature of this helicopter is that the EPGDS provides the ability to electrically start the main engines via the AC starter-generators.	Y	Y	C	B	B

Base Helicopter: **AW189** ∆ 2 **Difference Helicopter:** **AW139**				**COMPLIANCE METHOD**		
	The baseline EGPDS is grouped into three defined Subsystems: - AC Start-Generation Subsystem (ACSGS); - DC Generation Subsystem (DCGS); - AC/DC Power Distribution and Control subsystem (AC/DC PDCS). **AW139** Engine Start may be performed either by Battery or with external DC generator. Manual Engine Start is also possible.					
Basic Avionics System	**AW189** VFR and IFR capable fully integrated avionic system with four 10”X8” color Active matrix LCD and 4-axis AFCS. Cockpit Display System 2 Primary Flight displays (PFD) 2 Multifunction Flight displays (MFD) 1 integrated Standby Instrument System (ISIS) 2 Display Control Panels (DCP) 2 Cursor control Devices (CCD) 1 Reversion Control Panel (RCP) 1Display Dimming Control Panel (DDCP) - 2 Master Caution/Master Warning Lights (MCL/MWL) - 2 5-way switch on cyclic stick; Cursor Control Joystick (CCJ) **AW139** VFR and IFR capable fully integrated avionic system with four 6.6” X 8.7” color Active matrix LCD and 4-axis AFCS. Cockpit Display System 2 Primary Flight displays (PFD) 2 Multifunction Flight displays (MFD) 1 Electronic Standby Instrument System (ESIS) - 2 Display Control Panels (DCP) 1 Reversion Control Panel (RCP) 1 Display Dimming Control Panel (DDCP) 2 Master Caution/Master Warning Lights (MCL/MWL) 2 5-way switch on cyclic stick; Cursor Control Joystick (CCJ)	Y	Y	D	B	B
Rotor Brake System	**AW189** Is physically and functionally the same as the rotor brake that is fitted to the AW139 aircraft. **AW139** Is physically and functionally the same as the rotor brake that is fitted to the AW189 aircraft.	N	N	A	A	A

Base Helicopter: **AW189** **Difference Helicopter:** **AW139**		Δ 2		**COMPLIANCE METHOD**		
Fire Protection	**AW189** - 2 bottles for Engine #1 and #2 - 1 bottle for APU - - Check Tee Valve - Discharge indicators **AW139** - 2 bottles for Engine #1 and #2 - 1 bottle for APU - Check Tee Valve - Discharge indicators	N	N	A	A	A
Parameters Indicators	**AW189**: Digital indicators (NG , ITT, TQ, Engine oil temperature and pressure, Fuel pressure) **AW139** Digital indicators (NG , ITT, TQ, Engine oil temperature and pressure, Fuel pressure)	N	N	B	A	A
Recording Systems	**AW189** CVR/DVR **AW139** CVR/DVR	N	N	A	A	A
Navigation	**AW189** GPS/FMS equipped **AW139** GPS/FMS equipped	Y	Y	B	A	A
Electronic Flight Instruments System	**AW189** Full Glass Cockpit **AW139** Full Glass Cockpit	Y	Y	D	B	B
Helicopter Fuselage	**AW189** Length 14,62m - Width 2,55m - Height 4,04m **AW139** Length 13,53m - Width 2,25m - Height 3,57m	Y	Y	B	A	A
Main Rotor	**AW189** Fully Articulated Type Diameter: 14.60 m Number of blades: 5 **AW139** Fully Articulated Type Diameter: 13,8 m Number of blades: 5	Y	Y	B	A	A

Base Helicopter: AW189 **Difference Helicopter: AW139**	Δ 2			**COMPLIANCE METHOD**		
Tail Rotor	**AW189** Fully Articulated Type Diameter: 2,90 m Number of blades: 4 **AW139** Fully Articulated Type Diameter: 2,7 m Number of blades: 4	Y	Y	A	A	A
Engine Controls	**AW189** The EEC system permits the accurate control of the engine speed and protects the engine from over-speeding: the system is electronically redundant. **AW139** The EEC system permits the accurate control of the engine speed and protects the engine from over-speeding. The engine control system includes a manual back-up engine control system operated by push-pull cables.	Y	Y	C	C	C
Air Data Circuit	**AW189** Air data circuit with 2 pitots fitted on each side of the cockpit and static pressure ports embedded inside the pitot probes. **AW139** Air data circuit with 2 pitots fitted on each side of the cockpit and static pressure ports embedded inside the pitot probes.	N	N	A	A	A

Table 13: DR 3 – Maneouvres

Base aircraft: AW189 Δ 2 **Difference aircraft:** AW139				**COMPLIANCE METHOD**		
Manoeuvres	Differences	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
Flight manoeuvres and procedures						
Take-offs (various profiles)	Same philosophy with different parameters	Y	Y	D	D	D
Sloping ground take-offs & landings	The same	N	N	A	A	A
Take-off at maximum take-off mass	Same philosophy with different parameters	Y	Y	C	B	B
Take off with engine failure before reaching TDP	Same philosophy with different parameters	Y	Y	E	E	E
Take off with engine failure after reaching TDP	Same philosophy with different parameters	Y	Y	E	E	E
Landings, various profiles	Same philosophy with different parameters	Y	Y	E	E	E
Go-around or landing following engine failure before LDP	Same philosophy with different parameters	Y	Y	E	E	E
Landing following engine failure after LDP	Same philosophy with different parameters	Y	Y	E	E	E

Base aircraft: AW189 Δ 2 **Difference aircraft:** AW139				**COMPLIANCE METHOD**		
Manoeuvres	Differences	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
Normal and abnormal operations of the following systems and procedures						
Power plant system failure	Same philosophy with different representation	Y	Y	E	E	E
Vehicle Management system	Same philosophy with different parameters	Y	Y	E	E	E
Comfort system failure (air conditioning, heating, ventilation)	The same	N	N	A	A	A
Pitot/static system	Same philosophy with different parameters	Y	Y	D	D	D
Electrical system	AC APU	Y	Y	E	E	E
Hydraulic system	The same	Y	Y	B	B	B
Flight Display-system	The same small changes	Y	Y	E	D	C
Anti- and de-icing system	Like H1, optional systems	Y	Y	A	A	A
Auto Flight Control System	Same philosophy	Y	Y	E	E	C

Weather radar, Radio-Altimeter, Transponder, ACAS, T.CAS	Same philosophy	Y	Y	D	D	C
Navigation : Flight Management System	GPS/FMS	Y	Y	E	D	D
Auxiliary power unit	APU	N/A	N/A	N/A	N/A	N/A
Abnormal and emergency procedures						
Smoke control and removal	The same	N	N	B	B	B
Single engine failures	Same philosophy with different parameters	Y	Y	E	E	D

Base Helicopter: AW189 **Difference Helicopter: AW139**		Δ 2		**COMPLIANCE METHOD**		
Manoeuvres	Differences	FLT CHAR	PROC CHNG	Training	Checking	Recent Experience
Instrument Flight Procedures (To be performed in IMC or simulated IMC)						
Instrument take-off	The same	N	Y	D	D	D
Engine failure during departure	Only more power margin	Y	Y	E	D	D
Holding procedures	GPS or optional other FMS	N	Y	D	D	D
ILS-approaches down to CAT 1 decision height	Z axes AP controls & no NR^{ILS} switch	N	N	D	D	D
ILS-approaches manually, without flight director	4 axes AP controls & no NR^{ILS} switch	N	Y	D	D	D
ILS-approaches manually, with flight director	4 axes AP controls & no NR^{ILS} switch	N	Y	D	D	D
ILS-approaches with coupled autopilot	4 axes AP controls & no NR^{ILS} switch	N	Y	D	D	D
Non-precision approach		N	Y	D	D	D
Go-around with all engines operating	The same	N	N	D	D	D
Missed approach procedures	The same	Y	Y	D	D	D
Go-around with one engine inoperative	The same	Y	Y	D	D	D
IMC autorotation descent	The same	Y	Y	D	D	D
Recovery from unusual attitudes	The same	Y	Y	D	D	D