OPERATIONAL EVALUATION REPORT

AIRBUS HELICOPTERS

H160-B

REVISION ORIGINAL – DECEMBER 13, 2021

Revision Control

REVISION	DATE	HIGHLIGHTS OF CHANGE
Original	December 13, 2021	Original report.

Approval

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Table of Contents

1 Acronyms

ACH.......................... AIRBUS Corporate Helicopters

AFCS .... Automatic Flight Control System

AHRS .... Attitude and Heading Reference System

ANAC .... Agência Nacional de Aviação Civil (Brazilian Civil Aviation Authority)

ATO .... Approved Training Organization

CPT .... Cockpit Procedure Trainer

CS .... Certification Specification (EASA regulatory framework)

CS-FCD .... Certification Specifications for Operational Suitability Data (OSD) Flight Crew Data CSFCD, Initial issue, 31 January 2014.

CTR .... Conversion To Role

CWP .... Central Warning Panel

c-RFM .... Computer Rotorcraft Flight Manual

DG .... Directional Gyro

DU .... Display Unit

EASA .... European Union Aviation Safety Agency

EECU .... Electronic Engine Control Unit

ENG .... Engine

FADEC .... Full Authority Digital Engine Control

FDS .... Flight Display System

FFS .... Full Flight Simulator

FLI .... First Limitation Indicator

FLM .... Flight Manual

FMS.......................... Flight Management System

FND .... Flight and Navigation Display

FSTD .... Flight Simulation Training Device

FT .... Flight Time

GTC.......................... Ground Trajectory Command

H/C .... Helicopter

HLXT .... Helionix Trainer

HMI........................... Human Machine Interface

HTAWS .... Helicopter Terrain Awareness and Warning System

IAS .... Indicated Air Speed
IESI .... Integrated Electronic Standby Instrument
IFR .... Instrument Flight Rules
ILP .... Instructor Lead Presentation
ILS .... Instrument Landing System
IR .... Instrument Rating
IS …………………… Instrução Suplementar (Supplementary Instruction)
Kt .... Knot
LPC .... License Proficiency Check
MDR .... Master Differences Requirements
ME .... Multi-Engine
MFD .... Multi-Function Display
MGB .... Main Gear Box
MP .... Multi-Pilot
N1 .... Engine gas generator speed
NR/N2 .... Rotor speed and engines free power turbines speed
ODR .... Operator Differences Requirements
OEI .... One Engine Inoperative
OPC .... Operator Proficiency Check
OSD .... Operational Suitability Data
OTD .... Other Training Device
PC .... Proficiency Check
PF/PM .... Pilot Flying/Pilot Monitoring
POI .... Principal Operations Inspector
RBAC .... Regulamento Brasileiro de Aviação Civil
RFM .... Rotorcraft Flight Manual
RPM .... Revolutions/Rounds/Rotations Per Minute
SP .... Single Pilot
TASE .... Training Areas of Special Emphasis
TCAS .... Traffic Alert and Collision Avoidance System
TDP .... Takeoff Decision Point
TIP .... Technical Implementation Procedures
T/O .... Take Off
TOT .... Engine Turbine Outlet Temperature

VFR .... Visual Flight Rules

VHF .... Very High Frequency

VMS .... Vehicle Management System

VOR .... VHF Omnidirectional Range

2 Introduction

2.1 Background

The ANAC operational evaluation of model H160-B was conducted by documental analysis using the information provided by the manufacturer and the determinations of the Operational Suitability Data (OSD) – Flight Crew Report – Normal Revision 1 (Date 21-27, 26/07/2021).

Additionally, this operational evaluation took credits of EASA support on presenting their find of compliance made against CS-FCD under the procedures in line with the Technical Implementation Procedures (TIP) for airworthiness and environmental Certification Under the Agreement Between the Government of the Federative Republic of Brazil and The European Union on Civil Aviation Safety Revision 3, March 2017.

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

2.2 Objective

This report presents ANAC results from the operational evaluation of the aircraft H160-B.

2.3 Methodology

The documental analysis methodology used on this report implies that the ANAC did not get involved in any flight on the aircraft nor in any kind of training session.

Except for pilot rating determination and some references to the Brazilian regulations, all the technical data presented in this report are entirely based on the OSD-FC Report approved by EASA and in information provided by the 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 evaluation or publication of this document. Users should take account of subsequent amendments to any references, in particular concerning requirement for civil aviation aircrew and air operations.

Recommendations and determinations made in this document are based on the evaluations of specific configurations of aircraft models, equipped in a given configuration and in accordance with current regulations and guidance.

Modifications and upgrades to the aircraft evaluated can require additional ANAC assessment for type rating determination, training/checking/currency difference levels, operational credits, and other elements within the scope of the operational evaluations.

2.4 Purpose

The purpose of this report is to:

a. Provide a general description of H160-B;

b. Determine the pilot type rating assigned for the H160-B;

c. Provide recommendations for type specific training, including pilot pre-entry requirements, Training Areas of Specific Emphasis (TASE) and transition from another helicopter type;

d. Provide recommendations for checking, currency; and

e. Provide specifications for training devices.

2.5 Applicability

This report is applicable to:

a. Brazilian operators of the H160-B operating under the RBAC 91 and the RBAC 135 requirements;

b. Approved Training Organizations certified under RBAC 142;

c. ANAC Operations Safety Inspectors engaged in safety oversight activities of the H160-B;

d. ANAC Principal Operations Inspectors (POIs) responsible for H160-B operational certifications.

2.6 Cancellation

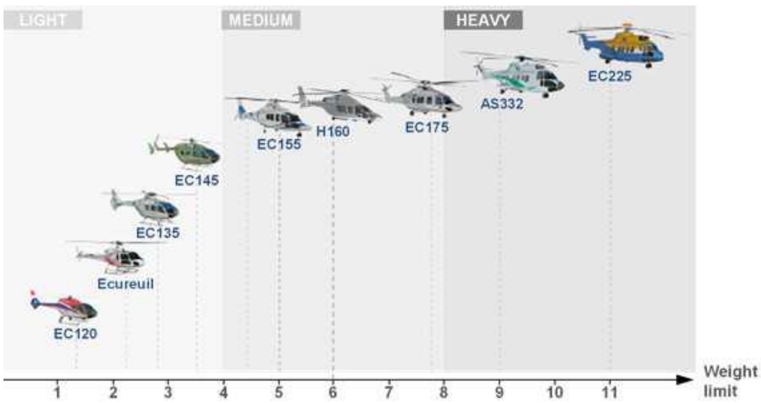
Not applicable.

3 General Description

3.1 General

Airbus Helicopters manufacturer produces the H160 in a single model “H160-B”. The H160-B is a transport category, twin Turbine Engines medium helicopter, approved as Large Rotorcraft under RBAC 29, Category A and category B.

The H160 is a 6 tons class multi-mission helicopter, approved for VFR and IFR operations, day and night, in non-icing conditions. Joining the helicopter product range between the EC155 and the EC175, this innovative medium helicopter becomes the first member of the “H type” generation.



The developed configurations include commercial passenger transport, business and private aviation (known as the ACH160), offshore transportation, public services.

Minimum crew is: (as stated in the Rotorcraft Flight Manual).

· One pilot for VFR or IFR operation.

NB: H160-B can be operated with two (2) pilots (VFR or IFR) according to applicable regulatory requirements.

H160-B can accommodate up to 12 passengers (excluding flight crew).

3.2 Main Characteristics

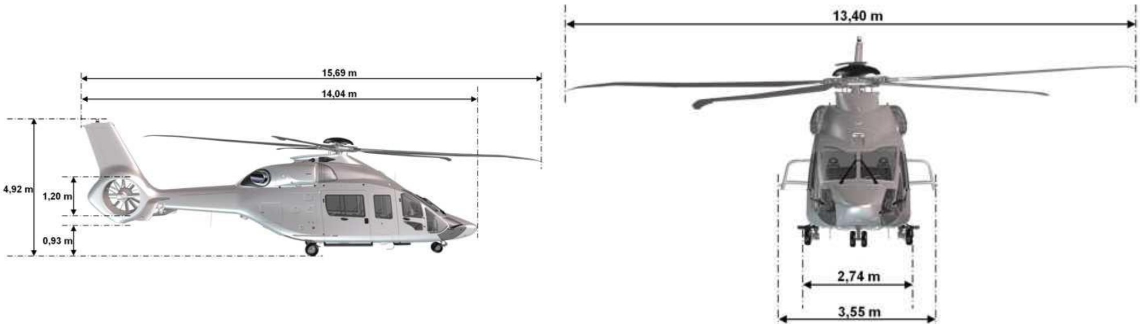


Table 1 – H160-B main characteristics

Features[1]			H160-B
External Dimensions			See picture
Engines			2 x SAFRAN (SHE) ARRANO 1A
Fuel tanks			1400 l
Air Speed	Absolute VNE	Power ON	170 kt
		Power OFF	135 kt
	Max Cruise Speed		155 kt
	Nominal		321,6 rpm (100%)
Rotor Speed	Power ON	Max cont.	346,7 rpm (107,8%)
	Power OFF	Max cont.	353,1 rpm (109,8%)
Weight	MGW		3760 kg
	MTOW		6050 kg
Category A	Density Altitude	Clear Heliport	12500 ft
		VTOL operations	9000 ft

(1) Initial certification features, which may be subject to regular changes

3.3 Main Specific Description

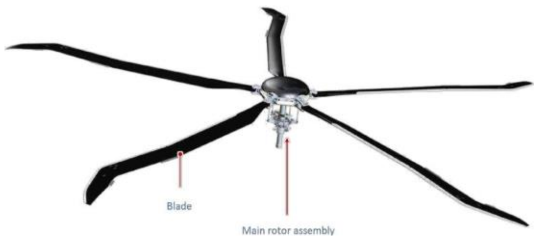
3.3.1 Engines

The H160 is powered by two SAFRAN (SHE) ARRANO 1A engines installed in their respective engine compartments located on each side of the helicopter at the top of the fuselage and rearward of the MGB. The ARRANO 1A is a 900 kW class turbo shaft and modular engine.

Each engine is associated with an Engine Electronic Control Unit (EECU).

3.3.2 Main Rotor and Blades

The H160-B is fitted with a Spheriflex type main rotor. The main rotor is rotating clockwise. It is tilted 4° longitudinally (forward) and 2° laterally (right) (the main rotor inclination and orientation is imposed by the Main Gear Box)

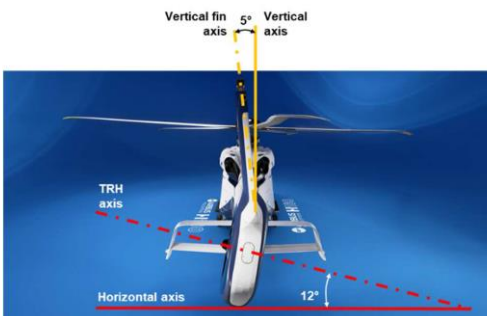


The rotor includes five “Blue Edge” blades. Blue Edge blades technology reduce by 50% the perceived sound and increases lift performance.

3.3.3 Tail Rotor

<u>New canted Fenestron</u>

The H160-B rear fuselage presents a 12° inclined Fenestron including a stator. This orientation improves the handling qualities, enhances aircraft stability in cruise and maneuvering flight, and increases slightly lift performance.

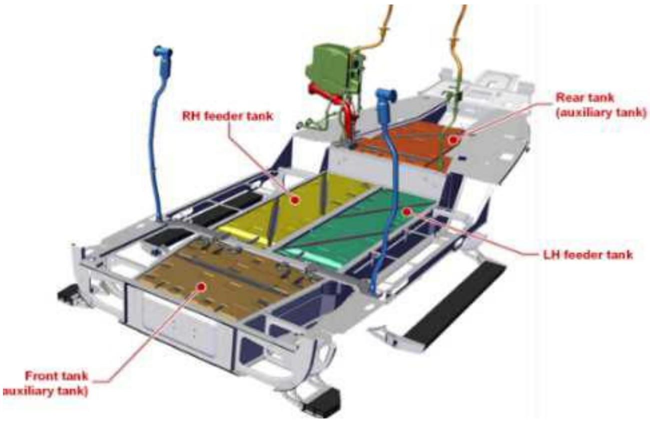


The biplane stabilizer improves significantly the aircraft stability on the pitch axis in cruise flight. Its doubled plan stage architecture decreases the side effects of the rotor down wash while transitioning to or from the hover.

3.3.4 Fuel System

The fuel system includes four crashworthy tanks located under cabin and cargo floors (two feeder tanks and two auxiliary tanks). The total amount of usable fuel is about 1400 liters.

Engine fuel feeding relies on engine self-suction capability: no booster pump is installed inside fuel tanks.



3.3.5 Electric System

The H160-B electrical power supply is based on a 28 VDC power network, provided by four sources:

• Two controlled starter generators (reversible machines also used to start the engines), mounted and driven by engines;
• Two batteries;
• One emergency generator, driven by the MGB; and
• One Ground Power Unit (GPU).

3.3.6 Cockpit Layout - Avionics controls and displays

The H160-B cockpit is designed to offer an enhanced visibility to the crew, either for single or dual pilot operation and provides an easy access to the controls allowing quick and efficient pilot actions.

Combined with a modern avionics system and efficient automation it decreases the crew workload and makes the H160-B easy to operate.

The H160 HMI concept is the same used on the EC175. FOBN 16-00 provides a detailed description and recommendations for operations.

The instrument panel is equipped with the four MFDs (screen of 6x8 inches). The Overhead Control Panel integrates controls which are used either on ground (normal procedures, engine start), or in flight (emergency procedure, reconfiguration procedures, engine failure training management).

The inter-seat console integrates controls to manage the Automatic Flight Control System (AFCS), navigation (Flight Management System – FMS), radar and communication (Inter Communication System – ICS, radio sets).

The cyclic grip allows managing the AFCS configuration and modes, ICS/radio push-to-talk, hoist, external load.

The collective grip allows managing AFCS modes, One Engine Inoperative (OEI) limits, wipers, landing lights and Emergency Floatation System (EFS).

3.3.7 Helionix

Helionix is an integrated avionics suite, developed with the same philosophy and architecture principles on all “Helionix Family” Airbus helicopters (EC135 P3H/T3H, BK117-D2/EC145T2, EC175B), using up-to-date technologies and providing a global avionics approach which assists the crew in performing the following management functions:

- Flight management and control,
- Navigation management,
- Vehicle and engine management (VMS, UMS, Recording)
- Mission management.

The HELIONIX key concepts and functions are:

• Automatic Flight Control System (AFCS)
• Alerting management, which replaces the conventional Control Warning System on the H160
• Failure management,
• Automatic reconfiguration,
• Centralized maintenance,
• Flight Monitoring

3.3.8 Automatic Flight Control System

To decrease the pilot's workload the Automatic Flight Control System (AFCS) is a digital basic 4-axis autopilot (pitch, roll, yaw and collective). It belongs to the APM2000/2010 family developed on all types of the last AH twin-engine helicopters generation range (from EC135H to EC225).

It provides a basic long-term attitude retention on the pitch and roll axes and heading hold in hover or turn coordination in cruise flight on the yaw axis including power protection. A wide choice of upper modes is available to decrease the pilot's workload in all flight configurations.

The AFCS push buttons on the grips provide not only hands on mode control, but also, redundant AFCS and upper mode management to the single Auto Pilot Control Panel (APCP).

The system is redundant: one AMC AFCS partition (dual channel) is in control and the other in hot stand-by (dual duplex architecture). The IESI provides a back-up Stability Augmentation System on the pitch, roll and yaw axes.

Sensors are redundant, their outputs are monitored by the AFCS itself and it will automatically reconfigure to provide the best handling qualities and the lowest crew workload.

The basic principle is that a single system failure does not degrade system operation.

3.3.9 Situational awareness Cameras and video data

To increase flight safety, the modern HELIONIX avionics integrates different systems to improve the crew's situational awareness.

Three systems increase the crew's situational awareness mainly in preventing Controlled Flight Into Terrain (CFIT):

• Synthetic Vision System (SVS);
• Digital map (DMAP); and

• Helicopter Terrain Avoidance Warning System (HTAWS).

The weather radar provides return signals (echoes) from clouds or rainfalls in air-to air mode, and surface targets (islands, bridges) and beacons in air-to-ground mode.

The tail fin camera (TFC) provides real time video of the aircraft taken from the top of the allowing monitoring boarding operations (on ground) or investigating the covered airframe parts (in flight). Video data are recorded into the Cockpit Voice and Flight Data Recorder (CVFDR).

SVS

DMAP

HTAWS

TFC

WXR

In addition, a Cockpit Video Camera (CVC) provides cockpit ambiance pictures recorded to its internal memory and SD Card, and sent to the Cockpit Voice and Flight Data Recorder (CVFDR).

4 Pilot Type Rating

4.1 Type Rating and license endorsement

The pilot type rating determined to the H160-B helicopter is "**H160**".

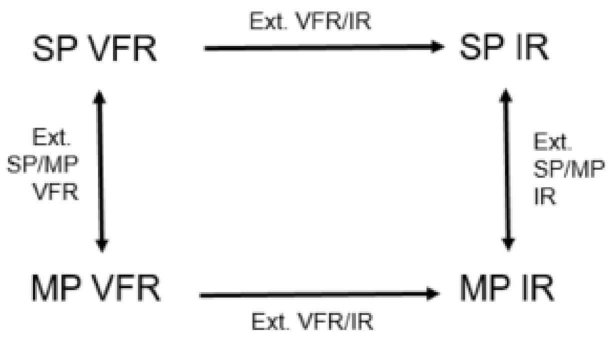
Table 2 – H160-B pilot type rating

Fabricante *(Manufacturer)*	**Aeronave** *(Aircraft)*		**Observações** *(Remarks)*	**Designativo** *(Designative)*
	Modelo *(Model)*	**Nome** *(Name)*		
AIRBUS HELICOPTERS	H160-B	H160	Relatório de Avaliação Operacional H160-B *ANAC Operational Evaluation Report H160-B*	H160

4.2 VFR / IFR operation and Single / Multi-Pilot privileges

The H160-B is certified as single-pilot multi-engine helicopter for VFR and IFR operation. The helicopter may be also operated in multi-pilot as determined by the operator Operations Manual. Flight crew members shall have been trained accordingly.

In any case, following logic applies to go through relevant extension(s) of privileges:



5 Operator Differences Requirements (ODR)

Operator Differences Requirements are the specific requirements necessary to address differences between a base aircraft and a related aircraft for type rating training, checking and currency assessment and for the content of the differences training syllabus.

The ODR tables with the EC175B as base aircraft are given in Appendix 3.

6 Master Differences Requirements (MDR)

The MDR matrix for the H160-B and EC175B is shown below. Definitions of the levels for training/checking/currency are those presented in ANAC Supplementary Instruction - IS 00-007.

<table>
<tr><th colspan="2" rowspan="2">H160-B</th><th colspan="2">From</th></tr>
<tr><th>H160-B</th><th>EC175B</th></tr>
<tr><th rowspan="2">To</th><th>H160-B</th><td>-</td><td>E/D/D</td></tr>
<tr><th>EC175B</th><td>Not evaluated</td><td>-</td></tr>
</table>

7 Specification for Training

7.1 General

The assessment is based on the H160-B Pilot Initial and Additional Type Rating Training syllabi, proposed by Airbus Helicopters.

For any training (Initial, Additional or Reduced Type Rating or extension of privileges), following principles should apply for the theoretical part of training:

- Information and procedures detailed in the FLM, especially related to FND management in IMC in case of IR extension.
- Standard Operating Procedures (normal and emergency procedure, use of checklists).
- Cockpit organization.
- Management of emergency, including reconfiguration philosophy and relevant CRM features.

For detailed evaluation of H160 cockpit interface and HMI, refer to FOBN 16-00 – “HMI concepts” which provides additional information for operations and training of the H160.

Flight Crew Operating Manual (FCOM) and/or Flight Operation Briefing Note (FOBN) provide standard operating procedures and recommendations, covering procedures, limitations and system descriptions. The FCOM and FOBN supplement the approved Flight Manual. They are intended to provide pilots with the necessary data and recommendation to operate the helicopter system more efficiently, at an enhanced safety standard. When published, the FCOM and FOBN should be used as guideline for training standardization.

7.2 Course Pre-entry Requirements

All candidates to an H160 type rating should fulfil the requirements corresponding to the applied privilege for either single-pilot or multi-pilot operations, or hold or have held a type rating on another multi-engine turbine helicopter type with the same privilege of operations.

7.2.1 Additional Type Rating

Candidates applying for Additional Type Rating must hold or have held a multi engine rating on another helicopter type.

7.2.2 Reduced Type Rating for Helionix Family

Based on commonalities between H160-B as candidate aircraft and EC175B as base aircraft, a Reduced Type Rating principle may apply for pilots operating on EC175B.

Candidates applying for a H160 reduced type rating must hold a valid EC175 type rating.

7.3 Type Rating Training Specification

7.3.1 General

Pilot training courses consist in two distinct training phases:

- Theoretical instruction program, including or not the use of Other Training Devices (OTD) for tutorial exercises and demonstration. A theoretical examination must be included at the end.
- Practical instruction performed on both helicopter and flight simulation training device (FSTD) where a suitable FSTD is available, or on helicopter only when no qualified FSTD is available.

Due to the complexity of the systems of the H160, integrated displays and automated systems, Airbus Helicopters highly recommends to use dedicated OTDs as described in the paragraph 9.2. When no OTD is available, additional use of an H160 type specific FSTD or real helicopter on ground may be proposed by the training organization.

7.3.2 Theoretical knowledge and Examination

a) Training duration

Tables provided in following paragraph 7.4 propose theoretical training footprints required for each Type Rating, Initial Type Rating (ITR), Additional Type Rating (ATR), and Reduced Type Rating (RTR) for pilots already rated on EC175.

The proposed theoretical footprints duration is considered as a minimum with the use of OTDs according to paragraph 9.2 and Appendix 1 recommendation. These footprints do not take into account operational constraints such as the number of trainees, adequacy with the number of available OTD, which may require extended duration.

Therefore, tuition time can be adapted by the ATO depending on:

- Applicant's ease, previous experience and language proficiency.
- Local training organization constraints (number and homogeneity of students, facilities, etc.).
- Use of standard aided instruction material (no use of OTDs).
- Number of optional equipment.

b) Theoretical knowledge examination

Considering H160-B as a complex single-pilot multi-engine aircraft, Airbus Helicopters recommends a theoretical knowledge exam based on 100 multiple-choice questions (in any case not less than 50 questions minimum). A pass rate of 75% is required to demonstrate the level of theoretical knowledge required for the safe operation of the aircraft.

7.3.3 Flight Training Course

a) Training duration

The amount of flight instruction on H160 takes into account:

- Complexity of the helicopter, handling characteristics, generation of technology and automation,
- Category of the helicopter (single pilot multi-engine turbine),

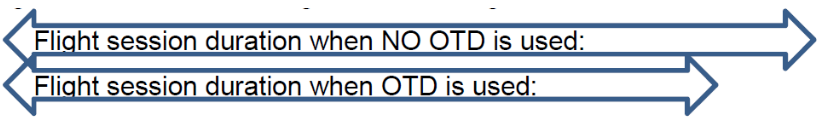
and will depend on:

- Previous experience of the applicant.
- The level and availability of qualified FSTDs and Other Training Devices (OTDs) as detailed in following paragraph 9.2.

Footprints provided in following paragraph 7.4 summarize the minimum flight training required as Pilot Flying (PF) for each Single-Pilot Type Rating (ITR, ATR, RTR), with and without integrated IR extension, and associated extension of privileges.

Average standard flight training session duration is 1h30 (between 1h15 and 2h, but not less than 1h30 in FSTD). Flight time can be adapted by the ATO depending on:

- Applicant's ease, previous experience, and language proficiency.
- Local operational constraints (e.g. flight time to transit from airfield to training areas…).
- Use of OTD(s) allowing tutorial exercises (see § 9.2 and appendix 1 recommendation), that may save the flight time of associated flight sessions, e.g.:



Additional flight training may also be necessary when the applicant cannot successfully demonstrate the ability to perform all maneuvers with a satisfactory proficiency.

b) Training content

An example of recommended flight-training session's objectives is given in Appendix 2.

c) Skill Test

See paragraph 8.1 – Specification for checking and currency - Skill test & Proficiency Checks.

For all duration in following tables, the skill test is not included and must be added.

d) Additional considerations

In all tables, training footprints for the MP privilege are the same, but a minimum recommended additional training duration as PM is 2h (in addition to total PF) to reach the MP skill test requirements. When an FSTD is used, it is recommended that trainees attempt several sessions as PF and PM as far as possible.

Where ATOs integrate type-rating training into an operator's commercial training requirements, additional specific training modules may be integrated into the operator's training package (see paragraph 7.5).

Furthermore, CRM, MCC and Line oriented flight training should provide additional training benefit.

7.4 Training Footprints

7.4.1 Initial SP Type Rating, VFR and IFR

When OTDs allowing tutorial exercises are available such as CPT, Airbus Helicopters recommends a minimum of 4 sessions during the theoretical instruction. Additional sessions may be proposed to optimize the flight training sessions.

Day 1	Day 2	Day 3	Day 4	Day 5
Classroom • WELCOME • A/C description • A/C documentation	Classroom • Airframe • CPT • Integrated avionics	Classroom • Integrated avionics • Situational awareness (SVS, DMAP, HTAWS, ...)	Classroom • FMS • Electrical system • Lights • Landing gear & Brakes	Classroom • Fuel • Powerplant
Day 6	**Day 7**	**Day 8**	**Day 9**	**Day 10**
Classroom • Powerplant • Fire protection system	Classroom • Rotor & rotor drive • Rotor flight controls • Hydraulic system • ECS • Ice & Rain protection	Classroom • AFCS&FDS main sensors • AFCS • CPT	Classroom • AFCS • Communication / Navigation system	Classroom • Flight planning • W&B&PERFO • CPT
Day 11	**Day 12**			
Classroom • Emergency equipment • Optional equipment	Classroom • CPT • Theoretical exam			
Flight 1	**Flight 2**	**Flight 3**	**Flight 4**	**Flight 5**
FFS or h/c VFR / IR Handling CAT.B - VFR (ref App 3 – Flight 1)	FFS or h/c VFR / IR Vehicle management. CAT.A - VFR (ref App 3 – Flight 2)	FFS or h/c VFR / IR Systems FDS & OEI CAT.A – VFR (ref App 3 – Flight 3)	FFS or h/c VFR / IR Procedures OEI CAT.B VFR (ref App 3 – Flight 4)	FFS or h/c VFR / IR Systems & engines VFR (ref App 3 – Flight 5)
Flight 6	**Flight 7**	**Flight 8**	**Flight 9**	**Flight 10**
FFS or h/c VFR / IR Procedure HELIPAD CAT.A – VFR (ref App 3 – Flight 6)	FFS or h/c VFR / IR Navigation VFR 1 Day or Night (ref App 3 – Flight 7)	FFS or h/c VFR / IR Navigation VFR Night (ref App 3 – Flight 8)	FFS or h/c VFR / IR Navigation VFR or IFR (ref App 3 – Flight 9)	FFS or h/c IR only Navigation IFR (ref App 3 – Flight 10)
Flight 11 (1)	**Flight 12 (1)**	**Flight 13 (1)**	**Flight 14 (1)**	
h/c VFR / IR Consolidation flight CAT.A or CAT.B VFR (ref App 3 – Flight 11)	h/c VFR / IR Consolidation flight CAT.A or CAT.B VFR (ref App 3 – Flight 12)	h/c VFR / IR Consolidation flight VFR Night (ref App 3 – Flight 13)	h/c IR only Consolidation flight Navigation IFR (ref App 3 – Flight 14)	

(1) When the training program is performed in h/c only, flights 11, 12, 13 and 14 are optional.

7.4.2 Additional SP Type Rating, VFR and IFR

When OTDs allowing tutorial exercises are available such as CPT, Airbus Helicopters recommends a minimum of 4 sessions during the theoretical instruction. Additional sessions may be proposed to optimize the flight training sessions.

Day 1	Day 2	Day 3	Day 4	Day 5
Classroom • WELCOME • A/C description • A/C documentation	Classroom • Airframe • CPT • Integrated avionics	Classroom • Integrated avionics • Situational awareness (SVS, DMAP, HTAWS, ...)	Classroom • FMS • Electrical system • Lights • Landing gear & Brakes	Classroom • Fuel • Powerplant
Day 6	**Day 7**	**Day 8**	**Day 9**	**Day 10**
Classroom • Powerplant • Fire protection system	Classroom • Rotor & rotor drive • Rotor flight controls • Hydraulic system • ECS • Ice & Rain protection	Classroom • AFCS&FDS main sensors • AFCS • CPT	Classroom • AFCS • Communication / Navigation system	Classroom • Flight planning • W&B&PERFO • CPT
Day 11	**Day 12**			
Classroom • Emergency equipment • Optional equipment	Classroom • CPT • Theoretical exam			
Flight 1	**Flight 2**	**Flight 3**	**Flight 4**	**Flight 5**
FFS or h/c VFR / IR Handling CAT.B - VFR (ref App 3 – Flight 1)	FFS or h/c VFR / IR Vehicle management CAT.A - VFR (ref App 3 – Flight 2)	FFS or h/c VFR / IR Systems FDS & OEI CAT.A – VFR (ref App 3 – Flight 3)	FFS or h/c VFR / IR Procedures OEI CAT.B VFR (ref App 3 – Flight 4)	FFS or h/c VFR / IR Systems & engines VFR (ref App 3 – Flight 5)
Flight 6	**Flight 7**	**Flight 8**	**Flight 9 (1)**	**Flight 10 (1)**
FFS or h/c VFR / IR Procedure HELIPAD CAT.A – VFR (ref App 3 – Flight 6)	FFS or h/c VFR / IR Navigation VFR or IFR (ref App 3 – Flight 9)	FFS or h/c IR only Navigation IFR (ref App 3 – Flight 10)	h/c VFR / IR Consolidation flight CAT.A or CAT.B (ref App 3 – Flight 11)	h/c VFR / IR Consolidation flight CAT.A or CAT.B (ref App 3 – Flight 12)

(1) When the training program is performed in h/c only, flights 9 and 10 are optional.

7.4.3 Reduced Type Rating (for EC175B Pilot Type rating holder)

When OTDs allowing tutorial exercises are available such as CPT, Airbus Helicopters recommends a minimum of 1 session during the theoretical instruction. Additional sessions may be proposed to optimize the flight training sessions.

Day 1	Day 2	Day 3	Day 4	Day 5
<u>Classroom</u> • WELCOME • A/C presentation • A/C documentation • Airframe • Alerting • EGDS • Lights • Landing gear & brakes	<u>Classroom</u> • Integrated avionic system • Fuel • Power Plant	<u>Classroom</u> • Integrated avionic system • Powerplant • Fire protection • Rotor & Rotor drives • Hydraulic • Flight controls • Ice & Rain protection	<u>Classroom</u> • Integrated avionic system • AFCS and FDS main sensors • AFCS upper modes • Flight planning • W&B - Perfos • CPT	<u>Classroom</u> • Communication / Navigation system • Emergency equipment • Theoretical exam
	Flight 1	**Flight 2**	**Flight 3**	
CPT or FFS (optional for IR) Navigation IFR	**FFS or h/c VFR / IR** Systems FDS & OEI CAT.A – VFR (ref App 3 – Flight 3)	**FFS or h/c VFR / IR** Systems & engines VFR (ref App 3 – Flight 5)	**FFS or h/c VFR / IR** Procedure HELIPAD CAT.A – VFR (ref App 3 – Flight 6)	

7.4.4 Extension of privileges

For IR extensions, all elements of RBAC 61 should be covered during the training.

IR Extension		
Day 1	**Flight 1**	**Flight 2**
Classroom • On request (1)	**FFS or h/c** Navigation IFR (ref App 3 – Flight 9)	**FFS or h/c** Consolidation flight IFR (ref App 4 – Flight 14)

(1) Depending on applicant previous experience (e.g. reminders on FMS management, FND management, H160 PBN/RNP approaches equipment…)

Extension SP to MP or MP to SP			
Day 1	**Flight 1** (1)	**Flight 2** (2)	**Flight 3**
Classroom • N/A	**FFS or h/c** Procedures OEI CAT.B VFR (ref App 3 – Flight 4)	**FFS or h/c** Navigation IFR (ref App 3 – Flight 9)	**h/c** Consolidation flight CAT.A or CAT.B VFR (ref App 3 – Flight 12) or Navigation IFR (ref App 3 – Flight 14)

(1) Applicable for VFR and VFR+IR extensions (not applicable when IR only)
(2) Applicable for IR and VFR+IR extensions when FFS is used (not required when the training program is performed in h/c only)

7.5 Training Areas of Special Emphasis

7.5.1 General

The following training tasks and procedures must receive special attention during initial and recurrent training. For a better understanding, TASEs description are listed by domain.

Helionix family aircraft are fitted with many safety equipment and highly integrated systems as HTAWS, TCAS2, Weather radar, Digital Map, SVS, FMS and Tail camera. Instructors shall remind trainees of all basic safety threats, such as CFIT, mid-air collision and degraded visual environment in order to prevent them from loss of attention and overconfidence in the aircraft systems.

The H160 helicopter is a highly automated aircraft. Training must be specifically designed to ensure that pilots master all features, automations of the avionics.

The H160 can be operated single pilot or multi pilot, so due to its high level of automation, CRM must be reinforced to cover both operational issues.

This leads to two separated but connected issues:

- Understanding how to use automation, hidden protections and aircraft projects of action awareness; and
- For all AFCS failures, the ability to identify remaining system capabilities.

Initial training and recurrent training are the major effective mitigation actions for these issues. Automation and its integration with all the helicopter’s systems must be taught in a comprehensive and global approach, rather than treating it as a separate subject.

Training providers must ensure that pilots completing training courses for highly automated aircraft have a detailed operational knowledge of the automatic flight systems and have demonstrated competence in their use.

7.5.2 Cockpit Settings and Helicopter Handling

<u>Pilot seat height</u>: as stated in the RFM section 4, adjust height to have a tangential view above instrument panel sunshield, in order to enlarge the field of view and to improve the sight of the landing area on short final.

<u>Collective pitch friction</u>: The collective stick position is normally changed by pressing the trigger. Nevertheless, if needed, the collective axis can be moved without pressing the trigger but with an increased friction force.

Taxiing: H160 should be able to taxi only with collective pitch (for speed) and yaw to turn. Cyclic can be used on lateral axis to compensate the wind and on longitudinal for slope area. To limit the cyclic motion on ground, the pilot can use the trim.

Establish on take-off spot before hovering use of flight controls centering device (Beware this operation clears all the AFCS presetting's: preset ALT-A after).

7.5.3 AFCS

AFCS protections, which allow a high level of safety in the trajectory management, need to be fully demonstrated in order to emphasize the notion of hidden project.

Demonstrate how to leave unusual position in flight, above 30 kt: double click on recovery button, stress on the level off flight, and below 30 kt: press GA button stress on reversion to V/S and IAS or press HEIGHT HOVER to stabilize hover close to the ground.

A highlight of specific AFCS upper modes must be done such as GTC, HEIGHT HOVER, GO AROUND, track modifications with bip trims, Automatic TAKEOFF.

A specific exercise must be performed to demonstrate the Vortex alerting and the procedure to recover.

However, red-alerting demonstration must only be performed in the FSTD, when available.

Functionality of the OVERRIDE indication when AFCS detects hands-on (or feet on) must be demonstrated.

7.5.4 Engine failure

When the power is set on the blue safety pitch symbol on the FLI, the helicopter is able to keep the current flight path in case of power loss of one engine (OEI HI below 80kt, OEI CT above).

During Helipad takeoff with engine failure, left wind has to be avoided. H160 needs a consequent additive power with left wind in Hover flight. This phenomenon can be efficiently demonstrated in the FSTD while performing a Helipad takeoff with engine failure with for instance 15kt of headwind then with 15kt of LH crosswind.

Abort training if rate of descent is greater than -1000ft/min.

7.5.5 Part Time Display – Master List

Except for engine start up, FND present all normal and critical data requested to fly. Especially any abnormal event is raised through the FND Master List or the dedicated alert in the corresponding area. Pilot has to rely on this Master list as primary alert and thus it is not necessary to monitor VMS page during normal operation. VMS allows getting precise vehicle data following FND event. NUM button clutters the display and then could be used temporarily.

Optimized configuration for flying is FND and second display adapted to the flight phase, thus not necessarily a VMS page. Except FND format, all other MFD can then be changed at pilot's discretion during the flight.

7.6 Specific Trainings

7.6.1 Electronic RFM

When c-RFM is used, the instruction shall focus on the correct operation of Hcrew and H160 Flight Performance applications. It is essential that the crew becomes familiar with the use and the contents of these tools.

7.6.2 Special Safety Training

A short reminder course on the operator's Safety Management System (SMS) is recommended.

Other special safety trainings aim at enhancing crew understanding and confidence in aircraft handling qualities, optional equipment and procedures related to design characteristics and limitations. It may cover the following item:

- recovery from unusual attitudes;
- manual flight with minimum use of automation, including flight under degraded levels of automation;
- handling qualities and procedures during recovery from an upset condition
- VORTEX ring state: reminder on the phenomenon
- IIMC: Inadvertent IMC avoidance
- CFIT: Controlled Flight Into Terrain, emphasis on avoidance and escape maneuvers, altitude awareness, TCAS / HTAWS warnings, situational awareness and crew co-ordination, as appropriate.

For those special training, the use of FSTDs is strongly recommended.

7.6.3 Mission Optional Training

Ref Appendix 3 – paragraph 3 Optional Specific Equipment for levels of training and checking.

The operational use of some specific mission optional, not covered in the type-rating course, may require additional training. This training may be addressed in the frame of Conversion To Role (CTR) and mission training courses, under operators' responsibility.

For any CTR module, the "Previous experience" must be defined by the training organization. Appropriate training duration are to be adapted by operators and training organization to comply with applicable regulation and pilots competence-based requirements.

8 Specification for Checking and Currency

8.1 Skill Test & Proficiency Checks (PC)

Skill test can be performed on a suitable FFS or on helicopter when the suitable FFS is not available.

8.2 Recurrent Training and Checking

Recurrent training must be performed as specified in RBAC 61 and 135, when applicable.

Recurrent training programs must cover the identified Training Areas of Special Emphasis as described in this report (§ 7.5) over a period not exceeding 3 years.

8.3 Recent Experience

Recent experience follows the requirements of RBAC 61 and 135, when applicable.

8.4 Operation of More Than One Type or Variant

When operating in a mixed fleet it is recommended that the recurrent training and check are performed alternating yearly the H160-B and the EC175B as the base aircraft, in line with paragraph 8.2, complemented by the Reduced Type Rating (differences training) to the other aircraft, according to the ODR tables (Appendix 3, paragraph 2). It should be guaranteed that at least one recurrent check in both models is performed within the period of 24 months.

9 Specification for Training Devices

9.1 Flight Simulation Training Devices (FSTD)

RBAC 61 and 135 recognize the contribution of FSTDs to the training and checking of flight crews.

9.2 Other Training Devices (OTD)

An OTD is a training device other than FSTD.

9.2.1 Benefits for H160 Training

With regard to the fully integrated avionic of the H160 and its high level of automation, the training course must focus on the avionic general concept and philosophy to ensure the best functional knowledge and understanding by the trainees. Training programs should allow a progressive immersion of trainees in the aircraft avionic system along the complete training course, from the beginning of theoretical instruction up to the end of in-flight training. Training devices of different level of functionality may be used for this purpose.

OTDs enable development of skills during the theoretical instruction course, before starting the practical training, and optimize the efficiency of any flying sequence. Therefore, duration of flight training sessions may be reduced as described in above § 7.3.3.

The minimum duration for FFS sessions, proposed in above Training Footprints (§ 7.4), can be granted when the following objectives are reached with the use of such OTDs before starting practical flight training:

- Manage pre-start, start up and shut down normal procedures.
- Manage Integrated Avionics control and displays, master list and dispatch logic.
- Manage abnormal/emergency procedures logic.
- Manage AFCS logic of main upper modes and associated protections.
- Prepare and conduct an IFR navigation with FMS and AFCS.

Airbus Helicopters highly recommends their integration in any training plan, especially through dedicated instructor lead sessions during the theoretical instruction course. Training organization should also arrange free access timeslots for trainees to support their individual consolidation of knowledge and skills.

9.2.2 OTDs description

According to the simulation capabilities, different categories of OTDs may be considered as follows:

- Category “single system”: designed to reinforce the comprehension of some systems and to provide guided or self-learning activities for basic training on HMI (Human Machine Interface) of a single instrument, display and/or system (e.g. systems emulation tool such as FMS, Elec system, Fuel system).

- Category “automated system”: designed for automated system familiarization and training. It can be a simple generic fixed base instrument panel or a desktop trainer which replicates interaction between instruments and automated systems, that may allow tutorial exercises (e.g. Part Task Trainer).

- Category “integrated cockpit”: designed for an initial procedure training. It consists of a simple fixed base cockpit, which simulates most aircraft systems interacting with each other, and may allow tutorial exercises in immersive training. (e.g; Cockpit Procedure Trainer).

A brief description of the devices used by Airbus Helicopters for H160 type rating training footprints is provided in Appendix 1. They are adequate for a Level C training and currency.

APPENDIX 1

OTHER TRAINING DEVICES (OTDs) DESCRIPTION

1. System Emulator

Software that emulate various systems in order to facilitate their functionality understanding during the academic phase, in normal or emergency functioning. It simulates the control box associated with its functional schematic and a generator of situations.

It can be used either on the classroom screen under the instructor's supervision, and/or on the trainee's individual training tablets. It potentially saves number of functioning slides on classical ILP.

Following systems (non-exhaustive) may be emulated (one emulator per system):

- EGDS (Electrical Generation Distribution System).
- Landing Gears & Brakes System.
- Hydraulic System.
- Fuel System.
- ECS / ACS (Environmental Control System / Air Conditioning System).

These emulators should allow displaying step by step several modes:

- Normal Functioning:

  > Power on + test procedure.
  > Normal use.
  > Reconfiguration.

- Degraded Mode:

  > Selectable failures (compatible with FLM), (i.e. GEN 1 Disconnected).

2. Helionix Trainer (HLXT)

The HLXT is a two dimensional (2D) trainer, installed on a desktop. The whole HMI is displayed on 4 digital touch screens connected with real fixed grips. It provides a high fidelity Helionix simulation, based on an AH OEM software integration. It simulates the interactivity with instruments of the cockpit, allowing a solid understanding on how the automation works and how the information is displayed. It allows tutorial exercises of the aircraft integrated avionics system, to support the training for Controls & Displays, Normal/Abnormal functioning and Normal/Emergency procedures, for each aircraft system available on Helionix Trainer.

Operation is managed through an Instructor Operating Station (IOS) that provides control of the H/C flight conditions, the environment, the vehicle and the malfunctions.

It can be used:

- on classroom screen by the instructor (Soft-keys navigation logic, systems demo, normal functioning, failures initiation, and also emergency processing with e-RFL/MEL).

- on Helionix console for demo by instructor.

- in self-training for exercises under instructor supervision.

3. Cockpit Procedures Trainer (CPT)

The Cockpit Procedure Trainer recommended by Airbus Helicopters to reach the content and duration detailed in paragraph 7.3 is a three dimensional (3D) H160 type specific training device providing an open flight deck. It must consider the following requirements:

Technical aspect:

- Fixed-base type specific cockpit layout with switches and controls in a spatially correct position.

- Real grips and controls switches can be fixed but must be representative of H160-B controls.
- Avionic and system representative of H160-B avionic, with OEM original automated systems software inside.
- Subsystems, control panels, instruments and switches can be actuals or graphically simulated with interactive touch screens panels.
- Helicopter systems must be operative for ground and flight conditions. Simulated systems must be fully integrated to ensure correct interaction, especially between FMS, AFCS and flight navigation displays.
- Alerting system must be representative and fully integrated.

Flight Loop:

- The device must be representative of H160-B aircraft performance and AFCS upper modes.

Operating System:

- Environment must be realistic and capable of different set of conditions (normal and degraded), in flight and on ground.

APPENDIX 2

EXAMPLE OF FLIGHT TRAINING SESSION'S OBJECTIVES

The training objectives of each flight session is that the applicant reaches the skill for mastering the main points.

	Main points

Flight 1
Handling
CAT.B operations
VFR
	• Prestart, startup & shut down procedures.
	• Taxiing technique.
	• Overview of multi-engine helicopter operations and AFCS basic mode:
	  ○ Flight planning, Height / Velocity diagram.
	  ○ Procedures and trajectories described in FLM - Sect 4.
	• Aircraft control, AFCS Symbols, protection and aural warnings.
	• Handling quality and Vehicle response.

Flight 2 Vehicle management CAT.A operations VFR	• Respect of FLM & use of checklist. • Normal procedures with comment during start up. • Respect of slope limitations • Visualization of limitations (FLI, VMS). • Respect of trajectories during takeoff & landings. • Defined point of flight paths. • Vtoss concept in takeoff and landing phases. • Progressive use of upper modes.
Flight 3 Systems FDS & OEI CAT.A VFR	• Respect of paths during takeoff & landings. • Defined point of flight paths due to wind or mass conditions. • Reconfigurations done with identification, confirmation & action. • Use of limits OEI according to flight paths.
Flight 4 Procedures OEI CAT.B VFR	• Automatic engine limitation & NR control • Vtoss Mini and Vy concept in take-off and landing phases (Airspeed indicator) • Distribution of workload if MP, coordination and dialogue with the systems • Defined point of flight paths • Visualization of limitations (FLI, VMS). • Analysis and decisions.
Flight 5 Systems & engines VFR	• Use of normal & emergency checklist, analysis and decision-making. • Reconfiguration procedures & Knowledge of the procedures. • Procedure knowledge. • Analysis and decisions.
Flight 6 Procedure HELIPAD CAT.A VFR	• Task sharing if MP, analysis and decision-making. • Rational use of AFCS. • Automatic T/O modes. • Decision point of flight paths. • Respect of CAT.A profiles and procedures. • Analysis and decisions.

	Main points
Flight 7 Navigation VFR Day or Night	• Good knowledge of FMS operations • Task sharing & CRM, analysis and decision making if MP only • Ensure redundancies systematically • Tolerances associated with the MMEL • Use of normal & emergency checklist • Engine Power Check
Flight 8 Navigation VFR Night	• Good knowledge of FMS operations • Co-operation between the pilot and systems • Task sharing & CRM, if MP only • Dialogue between crew & systems in normal & degraded situation • Cockpit & aircraft lighting management / Use of front lights
Flight 9 Navigation VFR or IFR	• Tolerances associated with the MMEL. • Co-operation between the pilot and systems. • Ensure redundancies systematically. • Dialogue between crew & systems in normal & degraded situation. • Use of normal & emergency checklist • Use of the multi-pilot task, briefings & crew checklist if MP.
Flight 10 Navigation IFR	• Tolerances associated with the MMEL. • Co-operation between the pilot and systems. • Ensure redundancies systematically. • Dialogue between crew & systems in normal & degraded situation. • Use of normal & emergency checklist. • Use of the multi-pilot task, briefings & crew checklist if MP.
Flight 11 Consolidation Flight CAT.A or CAT.B VFR	• Taxiing technique of short radius turn at low speed with AFCS engaged • Attitudes & engine information / FLI correlation • NR monitoring during descent • AFCS use & contribution • Slope limitations • Handling quality and Vehicle response
Flight 12 Consolidation CAT.A or CAT.B VFR	• Taxiing technique of short radius • Tight turn avoiding roll over • Computation of decision points Vmin ➢Corresponding announcements • Training mode test • Emergency procedure dealt with • Pilot's reaction - Corresponding announcements • Handling quality and Vehicle response
Flight 13 Consolidation Flight VFR Night	• Good knowledge of FMS operations • Co-operation between the pilot and systems • Task sharing & CRM, if MP only • Dialogue between crew & systems in normal & degraded situation • Cockpit & aircraft lighting management / Use of front lights
Flight 14 Consolidation Flight Navigation IFR	• Same as Flight 10

APPENDIX 3

OPERATOR DIFFERENCE REQUIREMENT (ODR) TABLES

1. Difference levels definition summary

Difference levels are summarized in ANAC Supplementary Instruction IS 00-007, section 7.3.4.

2. ODR tables for differences

2.1. H160-B (candidate aircraft) versus EC175B (Helionix step 3.2) (base aircraft)

The following ODR tables present the comparison in training, checking and currency from the EC175B in Helionix Step 3.2 configuration (base aircraft) to the H160-B in Helionix V9.0 (Step 3.3) (candidate aircraft).

This comparison aims at:

- Evaluating the differences for type rating assessment and the content of H160-B reduced type rating training syllabus for pilots type rated on EC175B;
- Identifying the differences on flight characteristics and procedures between both types, in terms of general characteristics, systems and maneuvers; and
- Substantiating the specification in training, checking and currency, for pilots qualified on EC175B and applying to an H160 type rating, and for pilots operating both helicopter types.

Base aircraft: EC 175 B Step 3.2 / Candidate aircraft: H160-B

Table 1: ODR 1 – General

Base aircraft: **EC 175 B - Helionix Step 3.2** **Candidate aircraft:** **H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
General	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Dimensions	Refer to the flight manual for the precise data. EC 175 B Step 3.2 Length: 18,06 m Height: 5,34 m Rotor diameter: 14,8 m H 160 B: Length: 15,69 m Height: 4,92 m Rotor diameter: 13,4 m	YES	YES	A	A	A

Base aircraft: EC 175 B - Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
General	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Flight deck general design	<u>EC 175 B Step 3.2</u> VFR and IFR single and multi-pilot certification depending on customer's choice (refer to the flight manual) • Overhead control panel: ○ Rotor brake control lever, ○ Lighting controls, ○ Storm light, ○ 2 cockpit standby static pressure ports selectors; • Instrument panel: ○ Four Multifunction Displays (MFDs), ○ Registration plate, ○ Integrated Electronic Standby Instrument (IESI), ○ Landing gear displays, ○ Controls of: ACAS, HTAWS, Wipers and Emergency Floatation System, windshield ice protection system control, radio altimeter, hydraulic auxiliary pump, lamp audio, AFCs preflight test; • Pedestal: ○ Controls of: engines, navigation aids, communication systems, vehicle systems (lighting, temperature…), ○ Circuit breaker panel, ○ FMS; • Cockpit emergency exits: windows jettisoned to the inside. <u>H 160 B</u> VFR and IFR single certification. HMI interface functions are spread on several areas of the H160-B cockpit: • Overhead Control Panel, ○ Engine controls, vehicle systems controls (Electrical system, hydraulic system, radio altimeters, …) ○ No storm light; ○ Integrated lighting automatically turned on in day mode. • Central control panel (between instrument panel and pedestal): ○ Integrated Electronic Standby Instrument (IESI), ○ Landing gear control and displays, ○ ACAS, HTAWS, Wipers and Emergency Floatation System controls, ○ 2 cockpit standby static pressure port selectors, ○ Ventilation outlets; • Instrument Panel, ○ Four Multifunction Displays (MFDs), ○ Registration plate, ○ Storage and/or additional instruments; • Pedestal: ○ Controls of: navigation aids, communication systems, vehicle systems (lighting, temperature…), ○ Circuit breaker. • Cockpit emergency exits: windows jettisoned to the outside.	NO	YES	B	A	B

Base aircraft: EC 175 B - Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
General	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Cabin lay out	<u>EC 175 B Step 3.2</u> Maximum 16 passengers <u>H 160 B</u> Maximum 12 passengers	NO	YES	A	A	A
Engines	<u>EC 175 B Step 3.2</u> 2 Pratt & Whitney PT6C-67E, on the upper deck, aft of the MGB. As the engine outputs its power to its aft the engine is mounted opposite of the flight direction. <u>H 160 B</u> 2 Safran Helicopter Engines ARRANO 1A, on the upper deck aft the MGB. As the engine outputs its power to its front the engine is mounted in flight direction.	YES	YES	A	A	A
	Refer to the flight manual for the precise data. <u>EC 175 B Step 3.2</u> The aircraft can be operated in limited icing conditions. The flight manual is provided in paper format 2 volumes or as pdf file including performance charts and supplements for additional system description. An optional performance computation software is available. • Maximum gross weight in flight : 7800 kg (17196 lb). • OAT: from -40°C to ISA+40°C, limited to a maximum of +50°C. • Altitude limits ○ Take-off and Landing: Category A: from -1500 ft Hp up to +13 000 ft Hσ, Category B: from -1500 ft Hp up to +13 000 ft Hσ, ○ Flight: from –1500ft Hp to +15 000 ft Hσ. • VNE: ○ Power-on depend on Hp, Max = 175 kt IAS (324km/h IAS), ○ Power-off: VNE power-on - 40KIAS (74km/h IAS). • Engine: 2 X PT6C-67E: ○ Limits: N1, TOT, Torque, AEO: MTP 20s / MTOP 5min / MCP unlimited / EP 30min continuous within 50min cumulated during the same flight	YES	YES	B	B	B

Base aircraft: EC 175 B - Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
General	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Limitations	OEI: Overshoot / HI 30s / LO 2min / CT unlimited, ○ Free turbine – N2: Max; max continuous / Min continuous, ○ Engine oil temperature: depend on oil type, ○ Engine pressure in operation. • Rotor ○ Power-On flight: Maximum continuous rotor speed 107% (298.5rpm), Minimum continuous rotor speed 95% (265.2rpm), Minimum transient rotor speed in flight AEO and OEI 83% (231.7rpm). ○ Power-Off flight: Maximum transient rotor speed (20s max.) 117% (326.7rpm), Maximum continuous rotor speed 110% (307.1rpm), Minimum continuous 87.5% (244.3rpm), Minimum transient rotor speed 83% (231.7rpm). • MGB ○ Temperature: Max: 120°C, Emergency lubrication: 200°C. ○ Pressure: No Max MGB Pressure, Min MGB Pressure: 0.5 bar. <u>H 160 B</u>: Flight in known Icing conditions is prohibited. The flight manual is provided on an iPad viewer application in 2 volume files or as a pdf file. Performance computation is provided on a separate approved application linked to the viewer with automatic transfer of the viewer chosen aircraft configuration. The additional system description is integrated in the volume 1 or 2 files and not as a supplement. • Maximum take-off weight: 6050 kg (1338 lb). • OAT: from -40°C to ISA +37°C, limited to a maximum of +50°C. • Altitude limits ○ Take-off and Landing					

Base aircraft: EC 175 B - Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
General	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
	• Mini: - 1500 ft pressure altitude (- 9400 ft density altitude), • Maxi: Category B: 13 000 ft density altitude, Category A clear area: 12 500 ft density altitude, Category A ground helipad: 9000 ft density altitude, Category A helideck: TBD, Hover OGE: 15 500 ft density altitude, ○ Flight: from –1500 ft to +20 000 ft pressure altitude. • VNE ○ Power-on: Max = 170 kt IAS up to 5000ft, above 5000ft decreasing, - 3 kt/1000 ft. ○ Power-off: absolute 135 kt, VNE power off = power-on – 35 kt IAS. ○ OEI: VNE OEI = VNE power off. • Engine, 2 X ARRANO 1A ○ N1, TOT, Torque Limits. AEO: MTP 20s / MTOP 5min / MCP unlimited / EP 30min continuous within 30min cumulated during the same flight. OEI: Overshoot / HI 30s / LO 2min / CT unlimited. ○ Free turbine – N2: Max; max continuous / Min continuous. ○ Engine oil temperature: depend on oil type. ○ Engine pressure in operation. • Rotor ○ Power-On flight: Maximum continuous rotor speed 107.8% (346.7 rpm), Minimum continuous rotor speed 92% (295.9 rpm), Minimum transient rotor speed in flight AEO and OEI 83% (266.9rpm). ○ Power-Off flight: Maximum transient rotor speed 117% (376.3 rpm), Maximum continuous rotor speed 109.8% (353.1 rpm), Minimum continuous 92% (295.9 rpm), Minimum transient rotor speed 83% (266.9rpm). • MGB ○ Temperature: Max: 120°C with O155 oil (66°C with O148 oil). ○ Pressure Max MGB pressure: 7 bar main circuit, 6 bar secondary, except starting in cold weather (12 bar).					

<table>
<tr><td colspan="2">Base aircraft: EC 175 B - Helionix Step 3.2
Candidate aircraft: H 160 B – Helionix V9.0</td><td colspan="2"></td><td colspan="3">COMPLIANCE METHOD</td></tr>
<tr><td>General</td><td>Differences</td><td>FLT CHAR</td><td>PROC CHNG</td><td>Training</td><td>Checking</td><td>Currency</td></tr>
<tr><td>Limitations (cont'd)</td><td>Min MGB Pressure: 0.6 bar, main and secondary circuits.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Performance</td><td><u>EC 175 B Step 3.2</u>
• Demonstrated Wind Envelope.
• Air Data system calibration.
• Hover Performance.
• Climb performance.
• Take-off and Landing Performance.
• TAS-CAS correspondence chart.
• Noise levels.
• Additional section SUPP 1 for Category "A" operation.
• Performance with winter kit.

<u>H160-B</u>
• Demonstrated Wind Envelope.
• Air Data system calibration.
• Hover Performance.
• Climb performance.
• Take-off and Landing Performance.
• TAS-CAS correspondence chart.
• Noise levels.
• Category "A" operation.</td><td>YES</td><td>YES</td><td>B</td><td>B</td><td>A</td></tr>
<tr><td>Weight & balance</td><td><u>EC 175 B Step 3.2</u>
• Minimum gross weight in flight: 4900 kg (10803 lb).
• Maximum gross weight in flight : 7800 kg (17196 lb).
• Maximum gross weight on the ground : 7850 kg (17306 lb).
• Longitudinal CG limited from 7,15m to 7,50m (refer to FLM section 2).
• Lateral CG from - 0.05 m to + 0.05 m of symmetric plane.

<u>H160-B</u>
• Minimum gross weight in flight: 3700 kg (8157 lb).
• Maximum take-off weight: 5669 kg (12498 lb).
• Extended gross weight: 6050 kg (1338 lb).
• Maximum gross weight for taxiing : 6100 kg (13448 lb).
• Longitudinal CG limited from 5,092m to 5,390m (refer to FLM section 2).
• Lateral CG from - 0.065 m to + 0.065 m of symmetric plane.</td><td>YES</td><td>YES</td><td>B</td><td>B</td><td>A</td></tr>
</table>

Table 2: ODR 2 – Systems

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Systems	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Flight displays	EC 175 B Step 3.2 4 Night Vision Goggles (NVG) compatible 6x8 inches portrait screens Multi Function Displays (MFDs): • format tree, under crew control, • the outer MFDs display FND page (Flight and Navigation Display), • the inner MFDs pages are selectable by the crew; default page at power-up is VMS page (Vehicle Management System), • upon outer MFD failure, the inner MFD is automatically reconfigured to FND and provides access to the other pages. H160-B Identical	NO	NO	N/A	N/A	N/A
Air data circuit	EC 175 B Step 3.2 • Pitot probes: ○ 3 total pressure ports (2 RH + 1 LH) forward of the cockpit; • Static ports: ○ 2 triple static pressure ports located on each side of the tail boom; • Temperature probes: ○ 2 temperature probes located close to the Pitot probes; • Cockpit static pressure ports: ○ 2 cockpit standby static pressure ports are located on the stand-by selectors, one dedicated to ADU2 and the other to the EISI; • Processing: ○ Air data are computed by the Air Data Units (ADU) and the AMCs. Information and control is provided to the crew via the MFDs primary flight displays (FND) and the Integrated Electronic Stand-by Instrument (IESI). ○ In case of double air data computer failure the vertical speed display is kept provided by the AHRSs. (inertial vertical speed only). The associated AFCS upper mode can be coupled without display change H 160 B Identical but: • Each main probe is fitted with a total pressure port dedicated to a single ADU and a dual static pressure port, one dedicated to each ADU, • Emergency total pressure ports located forward of the cockpit, • Emergency static ports located on each side of the airframe at cabin level, • 2 temperature probes located under the aircraft at cockpit level, T1 temperature provided by the EECUs is used to validate OAT in case of OAT discrepancy • 2 Cockpit static pressure ports located on the stand-by selectors, one dedicated to ADU1 and the other to ADU2.	NO	YES	B	B	A

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Systems	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
	• In case of double air data computer failure the vertical speed display is removed, replaced by an dedicated amber frame and V/S label. The associated AFCS upper mode can be coupled to the inertial vertical speed provided by the AHRSs. No mode displays change in the AFCS strip, but the instrument display remains degraded amber. The managed vertical speed is displayed in the upper window on a black background as a steady green triangle with the managed reference value in hundreds of feet below, minus, when descending.					
Warning Panel & Master List	<u>EC 175 B Step 3.2</u> Provided by the HELIONIX avionics integrated system, the alerting system: • centralizes all aircraft input parameters and statuses, • computes the alert activation logic, • prioritizes alerts, • displays alerts on the MFDs (master list concept) and on the CWP, • generates the audio alerting signals, • the clearance test steps are displayed to the crew, the resulting messages are displayed on a Vehicle Management System (VMS) system page subpage, • when the engine is shut down following an engine level 3 failure the red warnings on the master list are removed and replaced by an amber ENGINE OFF message as a reminder. <u>H 160 B</u> • Same HELIONIX concept, • No Central Warning Panel (CWP): cautions and warnings displayed on the MFD master list only, • Clearance test steps not displayed to the crew. The resulting messages available on the Vehicle Management System (VMS) dispatch page are automatically acknowledged by the system once the page is closed. • The dispatch page messages are the MMEL entry messages to be checked before take-off and available in flight as advisory messages. They also allow to plan the next flight. • The VMS system page is a subpage of the dispatch page, • Some of the advisory messages displayed on the master list of the reference aircraft will be displayed only as dispatch messages, • When the engine is shut down following an engine level 3 failure the red warnings on the master list are maintained to prevent any restart attempt. Only the engine failure red warning on the master list following an engine flame out is replaced by an amber ENGINE OFF message as the engine restart may be attempted, • New VORTEX conditions detection system: flight parameters are monitored by the AFCS, and a VORTEX caution or warning is displayed to the crew in the center of the attitude display when the conditions are met.	NO	YES	B	A	A

<table>
<tr><td colspan="4">Base aircraft: EC 175 B – Helionix Step 3.2

Candidate aircraft: H 160 B – Helionix V9.0</td><td colspan="3">COMPLIANCE METHOD</td></tr>
<tr><td>Systems</td><td>Differences</td><td>FLT CHAR</td><td>PROC CHNG</td><td>Training</td><td>Checking</td><td>Currency</td></tr>
<tr><td>Vehicle parameters indicators</td><td><u>EC 175 B Step 3.2</u>

Provided by the HELIONIX avionics integrated system, the functions of the Vehicle and engine Management System (VMS) are:

• Landing gear controls and monitoring (status…),
• air conditioning (ECS) controls and monitoring,
• ice and rain protection controls and monitoring,
• Hydraulic system controls and monitoring (level…),
• engines controls (NR laws) and monitoring (N1/N2/TOT/TRQ),
• engine states elaboration (OEI/AEO),
• engine power limits displays,
• First Limit Indicator (FLI) computation and display (Respect of the engines and Main Gear Box limitations), OEI safety pitch in cruise provides OEI LO rating,
• roll over avoidance computation and display,
• collective pitch position display,
• Transmission monitoring (MGB/ TGB oil pressures…),
• rotor speed monitoring (NR values),
• electrical system monitoring,
• Fuel system controls and monitoring (quantity, status…),
• fire protection controls and monitoring,
• Miscellaneous (door indicating, VNE, Float, Emergency lighting…).

<u>H 160 B</u>

• Same HELIONIX function and design,
• Different system pages due to different systems,
• First Limit Indicator (FLI) computation and display (Respect of the engines and Main Gear Box limitations), OEI safety pitch in cruise provides OEI CT rating,
• The electrical landing gear status is not displayed on a VMS page,
• New unusable fuel display in OEI or in case of system failure.</td><td>NO</td><td>YES</td><td>B</td><td>A</td><td>A</td></tr>
<tr><td>Main sensors</td><td><u>EC 175 B Step 3.2</u>

The AHRS control panel on the pedestal allows AHRS 1 & 2 alignment control as well as Directional Gyro DG mode selection and DG alignment control.

<u>H 160 B</u>

• The AHRS alignment control is performed virtually via a dedicated MFD control on the VMS RCNF reconfiguration page menu,
• DG selection is available on the NAVD, navigation display: both systems are selected using the dedicated LSK,
• DG selection is available the VMS RCNF reconfiguration page: each system is selected independently using a dedicated LSK,
• The DG alignment control is performed using the MFD rotary knob and push button.</td><td>NO</td><td>YES</td><td>B</td><td>B</td><td>B</td></tr>
</table>

<table>
<tr><td colspan="2">Base aircraft: EC 175 B – Helionix Step 3.2

Candidate aircraft: H 160 B – Helionix V9.0</td><td></td><td></td><td colspan="3">COMPLIANCE METHOD</td></tr>
<tr><td>Systems</td><td>Differences</td><td>FLT CHAR</td><td>PROC CHNG</td><td>Training</td><td>Checking</td><td>Currency</td></tr>
<tr><td>Electrical system</td><td><u>EC 175 B Step 3.2</u>

The main electrical generation and distribution system provides DC power via two 25A batteries, 2 starter generators and an emergency generator with an “OFF, ON, OVER” control panel to provide a redundant power supply to the emergency bus bars and, in the over position, to prevent the batteries from being discharged in case both generators are lost.

In case both generators are lost the system performs automatic load shedding.

An optional AC generation and distribution system mainly supplies the windshield ice protection system.

<u>H 160 B</u>

The main electrical generation and distribution system provides DC power via two 15A batteries, 2 controlled starter generators and an emergency generator, with an “OFF, ON” control panel to provide a redundant power supply to the essential and GPU essential bus bars. It does not prevent the batteries from being discharged in case both generators are lost.

In case both generators are lost the system performs automatic load shedding. The crew has to perform additional manual load shedding to prevent the batteries from being discharged.

A radio listening on ground switch provides a capability to use the pilot’s radio set on ground without supplying the whole circuit to prevent the batteries from being discharged.

There is no optional AC generation and distribution system.</td><td>YES</td><td>YES</td><td>C</td><td>C</td><td>B</td></tr>
<tr><td>Flight controls</td><td><u>EC 175 B Step 3.2</u>

• Conventional mechanical flight control systems (rods and flexible cables) and hydraulic servo controls.
• Classical side-by-side configuration.
• Totally separated controls systems for main rotor and tail rotor.
• Hydraulic pressure off, the collective stick position remains down</td><td>NO</td><td>YES</td><td>B</td><td>A</td><td>A</td></tr>
</table>

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Systems	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
	H 160 B Identical • Hydraulic pressure off, the collective stick position raises. It is automatically lowered by the AFCS flight controls re-centering function as soon as the hydraulic pressure is available at first engine start.					
Automatic Flight Control System	EC 175 B Step 3.2 The AFCS consists of : • duplex Digital 4 axes autopilot, • dual AFCS processing unit, • One trim actuator per axis, 2 SEMA actuators on the pitch, roll and yaw axes, one SEMA actuator on the collective axis. The Collective trim actuator is used as a backup sensor for the engine control system anticipation function. Purpose: • to acquire helicopter parameters (attitudes, angular rates…), • to compute and transmit relevant orders to the actuators (parallel and series actuators). Main functions: • The AFCS has to be turned on by the crew after the preflight test performed AFCS off. • basic stabilization mode on 3 axis: Pitch, Roll and Yaw, • upper modes on 4 axis: Pitch, Roll, Yaw and Collective, • IAS mode is automatic recoupled and MCP power limitation is restored after the Engine Power Check. H 160 B • The AFCS is turned on automatically and automatically re-centers the flight controls when hydraulic power becomes available at first engine start. Preflight test is performed AFCS on and tests the same items but in a shorter time. • Same AFCS architecture, purposes and main functions, • One trim actuator per axis, 2 SEMA actuators on the pitch, roll yaw and collective axes. The collective trim is the main sensor for the engine control system anticipation function (no back up), • The basic modes are identical, • 4 axis upper modes on pitch, roll, yaw and collective axes: same functions but variable reference trim speed, • The Go around mode: new displays, and a new logic on the roll and yaw axis, • The GTC mode: systematically coupling a collective axis mode (4 axes operation), • HEIGHT HOVER mode replacing the GTC.H mode: systematically coupling a collective axis, new HEIGHT mode (4 axes operation), same logic as GTC.H on the pitch and roll axes (ground speeds reduction down to 0), • Assisted take-off: new vertical and helipad take-off modes with trajectory management in AEO as well as trajectory and NR	YES	YES	B	B	A
Automatic						

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Systems	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Flight Control System (cont'd)	management in OEI before and after TDP.					
Radio com / radio navigation	<u>EC 175 B Step 3.2</u> VHF2 and VOR/ILS2 backup control is ensured via the CT4000 backup control panel on the pedestal. <u>H 160 B</u> VHF1 & 2 and VOR/ILS1 & 2 backup control is ensured using a virtual control panel via a dedicated NAVD LSK and the MFD rotary knob and push button.	NO	YES	B	A	A
Main rotor	<u>EC 175 B Step 3.2</u> Main rotor: • Five-blade "Spheriflex" type rotor, • Rotating clockwise, • Tilted 4.5° forward. The main rotor assembly is made up of: • Main Rotor Blades, • Main Rotor Head, • Swashplate assembly, • Main mast assembly. The blades are standard composite blades with high performances and low noise characteristics. The rotor brake message is triggered as soon as the lever is moved out of its OFF position, before it is actually applied, when at least one of the engines is not set to OFF. The system provides a variable NR speed control. <u>H 160 B</u> Main rotor • Five-blades "Blue Edge" concept (significant noise reduction and increased performances):	YES	YES	A	A	A

<table>
<tr><td colspan="4">Base aircraft: EC 175 B – Helionix Step 3.2
Candidate aircraft: H 160 B – Helionix V9.0</td><td colspan="3">COMPLIANCE METHOD</td></tr>
<tr><td>Systems</td><td>Differences</td><td>FLT CHAR</td><td>PROC CHNG</td><td>Training</td><td>Checking</td><td>Currency</td></tr>
<tr><td></td><td>o Straight part (0.6 R),
o Front part orientated at 7° (0.85 R),
o Rear part orientated at -25° (0.95 R);
• “Spheriflex” type rotor,
• Rotating clockwise.
• Tilted 4° forward, 2° right.

The main rotor assembly is made up of:

• Main Rotor Blades ,
• Main Rotor Head,
• Swashplate assembly,
• Main mast assembly.

The rotor brake message is triggered when applied and at least one of the engines is not set to OFF.

The system provides a NR high function and a variable NR speed control.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Tail rotor</td><td><u>EC 175 B Step 3.2</u>

The tail rotor is a “spheriflex” type.

• Rotating clockwise (seen from the LH side of the helicopter).
• Tilted 20° Upward.

Main components:

• 1 tail rotor head,
• 3 tail rotor blades,
• Rotating controls.

<u>H 160 B</u>

• The tail rotor head is a Fenestron type rotor consisting of a ducted rotor combined with a stator tilted 12° upwards,
• It is a ten blades variable pitch rotor installed inside a shroud.</td><td>YES</td><td>YES</td><td>B</td><td>A</td><td>A</td></tr>
<tr><td></td><td><u>EC 175 B Step 3.2</u>

The hydraulic system provides power assistance:

• To the flight servo-controls, main and tail rotor actuators,
• To retract and extend the landing gear,
• To the wheel brake system.

For redundancy purpose, the system is divided in two segregated circuits, one hydraulic circuit (MHS1 or MHS2) is sufficient to ensure servo-controls normal functioning.</td><td>YES</td><td>YES</td><td>B</td><td>B</td><td>A</td></tr>
</table>

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Systems	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Hydraulic system	• A mechanically driven pump provides the power to MHS1. • A mechanically driven pump provides the power to MHS2. An electrically driven pump is mainly used for the landing gear operation and wheel brake accumulator inflation but it is also used as a backup in case the main MHS2 pump fails. It is used on ground to check the flight controls freedom of movement. • An electrically driven emergency L/G pump supplies the L/G for emergency extension. It is associated to a dedicated emergency reservoir. • MHS1 supplies the upper body of the 3 main servo-controls and the RH body of the tail rotor actuator. • MHS2 supplies the lower body of the 3 main servo-controls and the LH body of the tail rotor actuator. The hydraulic control panel is composed of: • MHS1 by-pass switch and associated amber light, • MHS2 by-pass switch and associated amber light. The Hyd. aux. pump switch to control the hyd. aux. electrical pump (AUTO/OFF/TEST) is located on the center lower part (half right) of the instrument panel. Hydraulic parameters are displayed on MFDs. <u>H 160 B</u> The hydraulic system provides power assistance to the flight servo-controls (main and tail rotors). For redundancy the system is divided in two segregated circuits, one hydraulic circuit (HYD1 or HYD2) is sufficient to ensure servo-controls normal functioning. • A mechanically driven pump provides the power to the left hand HYD1 circuit. An electrically driven auxiliary pump available on ground only allows to check the flight controls freedom of movement. • A mechanically driven pump provides the power to HYD2. A mechanically driven emergency pump automatically supplies HYD2 circuit in case a failure is detected on HYD1 or 2 circuits or to ease HYD2 temperature increase in cold weather operation.					

Base aircraft: EC 175 B – Helionix Step 3.2 Candidate aircraft: H 160 B – Helionix V9.0				COMPLIANCE METHOD		
Systems	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Hydraulic system (cont'd)	Main functions The LH hydraulic circuit (HYD1) provides hydraulic power to the three Main Rotor Actuators (MRA) lower bodies and the Tail Rotor Actuator (TRA) LH body: • When rotor is turning, • When rotor is stopped (if needed). The RH hydraulic circuit (HYD2) provides hydraulic power to the three MRAs upper bodies and the TRA RH body: • When rotor is turning, • In case of main pump 1 or 2 failure or HYD1 loss following a leak. The hydraulic control panel located on the overhead panel is composed of: • HYD1 by-pass switch, • HYD1 auxiliary pump ON/OFF control switch. Hydraulic parameters are displayed on MFDs.					
Fuel system	EC 175 B Step 3.2 • The fuel system is a single-group type composed of five crashworthy tanks (bladder type). • Each engine is supplied from its dedicated feeder tank. Equipped with 2 booster pumps. • The booster pumps, started 20 seconds before engine start provide fuel to the engine as well as the motive fuel flow to the jet pumps to ensure that the feeder tanks are kept full as long as there is fuel in the storage tanks. • In normal operating conditions, once started, the engine is able to suck the fuel out of its feeder tanks. • Total fuel capacity (usable): about 2616 L (2067 kg). • Refueling can be performed via a dedicated gravity or pressure refueling port. • The fuel system monitoring and indicating is displayed on the MFDs pages. H 160 B • The fuel system is a single-group type composed of four crashworthy tanks (bladder type). • Each engine supply relies on its self-suction capability from its dedicated feeder tank: no booster pump is required. • 2 transfer pumps, each of them automatically started when the engine switch is moved from the off position to its idle or flight position, provide the motive fuel flow to the jet pumps to ensure that the feeder tanks are kept full as long as there is fuel in the storage tanks. • In normal operating conditions, without previous maintenance performed on the engine, the internal engine fuel	YES	YES	B	A	A

<table>
<tr><td colspan="4">Base aircraft: EC 175 B – Helionix Step 3.2
Candidate aircraft: H 160 B – Helionix V9.0</td><td colspan="3">COMPLIANCE METHOD</td></tr>
<tr><td>Systems</td><td>Differences</td><td>FLT CHAR</td><td>PROC CHNG</td><td>Training</td><td>Checking</td><td>Currency</td></tr>
<tr><td></td><td>circuit contains enough fuel to perform a successful engine start after 2 aborted starts without receiving any fuel from the fuel tank.
• The transfer pumps also provide the motive fuel flow to a starting ejector using the same Venturi principal as the jet pumps to send fuel to the engine in case the engine and engine fuel line is unprimed.
• Total fuel capacity (usable): about 1400 L (1120 kg).
• Refueling can be performed through one refueling port with a dedicated gravity or pressure refueling adaptor.
• The fuel system monitoring and indicating is displayed on the MFDs pages.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Engine & MGB Oil cooling system</td><td><u>EC 175 B Step 3.2</u>

MGB:

• One cooler is installed forward in front of the MGB. A pump draws the oil from the MGB sump through a strainer and delivers it through the oil cooler system installed in the air duct of a fan. Once cooled, the oil is injected into the MGB.

Engine:

• The engine compartments are cooled by a circulation of air induced by a Venturi effect created between the primary and the secondary exhaust nozzles of each engine.
• The engine oil cooling is ensured by a fuel / oil heat exchanger.
• The engine oil level has to be checked visually on the engine.

<u>H 160 B</u>

MGB:

• The oil cooling system principal is identical.

Engine:

• The engine compartment cooling is identical,
• Each engine is equipped with fuel / oil heat exchanger and an air/oil heat exchanger associated to a thermostatic by-pass valve.
• A fan driven by the engine accessory gearbox ensures airflow through the air /oil heat exchanger.
• An engine oil level display is provided to the crew as long as the engine is not running and again 2 minutes after engine shut down.</td><td>NO</td><td>YES</td><td>B</td><td>A</td><td>A</td></tr>
<tr><td></td><td><u>EC 175 B Step 3.2</u>

The H175 landing gears and wheel brakes are hydraulically powered by the auxiliary circuit of MHS2.</td><td>NO</td><td>YES</td><td>B</td><td>A</td><td>A</td></tr>
</table>

<table>
<tr><td colspan="2">Base aircraft: EC 175 B – Helionix Step 3.2

Candidate aircraft: H 160 B – Helionix V9.0</td><td colspan="2"></td><td colspan="3">COMPLIANCE METHOD</td></tr>
<tr><td>Systems</td><td>Differences</td><td>FLT CHAR</td><td>PROC CHNG</td><td>Training</td><td>Checking</td><td>Currency</td></tr>
<tr><td>Landing gear and wheel brakes</td><td>The landing gear consists of:

• 2 single-wheeled Main Landing Gears (MLG) located backwards of the helicopter’s center of gravity, and mounted symmetrically on both sides,
• 1 twin-wheeled Nose Landing Gear (NLG) located forwards of the helicopter’s center of gravity, and mounted on the center line of the helicopter.

The 2 MLG wheels are equipped with a wheel braking system, allowing proportional and differential braking as well as a parking brake function.

The nose wheel is equipped with a nose wheel locking system (in centered position).

A Landing Gear (L/G) control panel aft of the pedestal provides:

• Normal extension retraction control,
• Emergency extension control.

An electrically driven emergency L/G pump supplies the L/G for emergency extension. It is associated to a dedicated emergency reservoir.

A dedicated landing status light panel is located on the center lower part (right) of the instrument panel.

At the very end of the pedestal 2handles provide

• Parking brake control and status (handle position).
• Nose wheel locking control and status (handle position).

Status and failure messages are provided on the master list.

The lower half part of the VMS hydraulic system dedicated display provides additional landing and nose wheel centered status.

<u>H 160 B</u></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Base aircraft: EC 175 B – Helionix Step 3.2 Candidate aircraft: H 160 B – Helionix V9.0				COMPLIANCE METHOD		
Systems	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Landing gear and wheel brakes (cont'd)	The H160 landing gears and wheel brakes are electrically powered. The landing gear consists of: • 2 single-wheeled Main Landing Gears (MLG) located backwards of the helicopter's center of gravity, and mounted symmetrically on both sides, • 1 twin-wheeled Nose Landing Gear (NLG) located forwards of the helicopter's center of gravity, and mounted on the center line of the helicopter. The 2 MLG wheels are equipped with a wheel braking system, allowing proportional and differential braking as well as a parking brake function. The nose wheel is equipped with a nose wheel locking system (in centered position). A Landing Gear (L/G) control panel located on the center console :provides • Normal extension retraction control • Emergency extension control • Landing gear extension/retraction, extended/retracted status • Parking brake control and status • Nose wheel locking control and status If the normal extension fails, the emergency extension is started automatically. The emergency extension control has to be used only if the normal extension control fails. Status and failure messages are provided on the master list. There is no dedicated landing status on any VMS dedicated system page.					
Air conditioning system	<u>EC 175 B Step 3.2</u> The Environmental Control System (ECS) ensures fresh air and warm air circulation inside the aircraft. The Air Conditioning System (ACS) (optional) cools down cockpit and cabin compartments. ECS and optional ACS can be managed separately to control the cockpit and the cabin to a different temperature. The cockpit and cabin ECS / ACS (opt) main functions are:	NO	NO	N/A	N/A	N/A

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Systems	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
	• ECS demisting, • ECS ventilation, • ECS heating, • ECS / ACS cooling. Cockpit and cabin ECS (with ACS) equipment are identical in their concept and in most of their components. Automatic ACS cut off in case of MGB oil lubrication total loss H160-B Identical but adapted to the airframe.					

Table 3: ODR 3 – Maneuvers

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Take-offs (various profiles)	**EC 175 B Step 3.2** Hovering : 8 ft Cat. B: Nose down attitude minus 10° from hover attitude. At transitional lift (Approx. 25 Kt), reduce attitude by 5°. Increase COLL pitch up to MTOP to initiate climb. Increase IAS to Vy. Adjust power below MCP before reaching Vy. Cat. A Clear area: Adjust Vtoss on FND if necessary, then idem Cat.B. Cat. A Ground Helipad: Nose wheel locked. Set DH on RADALT. Enter HIGE 3 ft. Vertical climb at 500 ft/mn with pad in front part of cockpit lower window. From 50 ft, rearward climb at 500 ft/mn, keeping pad in front part of cockpit lower window. At TDP, nose down attitude minus 10°. As soon as “T” seconds are reached (FLM Sup.1 §1.1), reduce nose down attitude, adjust power to MCP before reaching Vy. Cat. A elevated Heliport or Helideck: Adjust altimeter and DH on RADALT. Parking brake applied. Nose wheel locked. Enter HIGE 3 ft with rotor at the edge of the pad. Establish positive R/C 500 ft/mn. At TDP 20 ft, nose down attitude minus 10°. Reduce nose down attitude at “T” after TDP. Reduce power to MCP before Vy. **H160-B** Hovering: 6 ft Cat.B: Nose attitude minus 10°. COLL pitch adjust to maintain T/O pass. Increase IAS to Vy. At 100 ft, adjust COLL pitch to MCP if necessary.	YES	YES	E	D	D

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
	Cat. A Clear area: Idem Cat.B. Cat. A Ground Helipad: Parking brake ON, NR high ON, HIGE = 6 ft. Climb vertically about 300 ft/mn. At 25 ft, go rearward 300 ft/mn, keeping forward part of helipad between pedals, up to TDP. Nose down minus 10° at TDP, COLL pitch to MTOP if necessary. Automatic T/O mode available. Cat. A elevated Heliport or Helideck: TBD					
Sloping ground take-offs & landings	**EC 175 B Step 3.2** Nose up max = 12° Nose down max continuous = 5° Nose down max with tail rotor clearance = 10° Maximum lateral slope = 8° **H160-B** Rotor stop/start, T/O, landing, all axis = 5°	YES	YES	A	A	B
Take-off at maximum take-off mass (actual or simulated maximum take-off mass)	**EC 175 B Step 3.2** MTOW with 9 pax seats or less = Weight limited by HIGE (ref. FLM 5.1 §6) MTOW with 10 pax seat or more = Weight limited by MTOW permitting climb at 150 ft/mn, 1000 ft above T/O surface with OEI at VY (ref. FLM 5.1 §7.3) **H160-B** MTOW = 6050 Kg	YES	YES	E	D	B

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Take-off with simulated engine failure shortly before reaching TDP. **Clear airfield**	**EC 175 B Step 3.2** MTOW for training = MTOW Cat. A minus 300 Kg Simultaneously, reduce COLL pitch to start descending and nose attitude +20°. When close the ground, increase COLL pitch to OEI Hi if necessary to control descent. Reduce attitude to +10°. Increase COLL pitch to caution landing with nose up attitude below +10°. **H160-B** MTOW for training = MTOW with calculated performance minus 200 Kg Simultaneously nose up attitude +15° and reduce COLL pitch to avoid climbing. Increase COLL pitch when aircraft has tendency to sink. Reduce attitude +5° when hearing audio warning, and increase COLL pitch to caution landing.	YES	YES	E	D	B
Take-off with simulated engine failure shortly after reaching TDP. **Clear airfield**	**EC 175 B Step 3.2** MTOW for training = MTOW Cat. A minus 300 Kg Identical except NR ≥ 96% to reach Vtoss and NR = 100% after Vtoss **H160-B** MTOW for training = MTOW with calculated performance minus 200 Kg Identical except NR = 102% during all the trajectory.	YES	YES	E	D	B
Take-off with simulated engine failure shortly before reaching TDP. **Helipad**	**EC 175 B Step 3.2** MTOW for training = MTOW Cat. A minus 300 Kg Reduce COLL pitch slightly. Maintain NR=100% while in OEI Hi. Adjust attitude to reach landing area. Gain 5 to 10 Kt ground speed. Around 50 ft, nose up attitude +20° to cancel speed then below +10°. Apply COLL pitch continuously depressing COLL trigger. **H160-B** MTOW for training = MTOW with calculated performance minus 200 Kg	YES	YES	E	D	D

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
	Adjust COLL pitch to maintain NR=102%. Adjust attitude to reach landing area. Around 20 ft, apply COLL pitch continuously. Near the ground, apply max COLL pitch if necessary to caution landing. Automatic rejected T/O when using automatic T/O mode.					
Take-off with simulated engine failure shortly after reaching TDP. **Helipad**	**<u>EC 175 B Step 3.2</u>** MTOW for training = MTOW Cat. A minus 300 Kg When failure occurs, nose down attitude minus 15°, lower COLL pitch to maintain NR ≥ 96% (audio alert). Reduce nose down attitude as soon as “T” sec are reach (refer to FLM Sup 1. §1.1). IAS Vtoss. Select OEI Lo. Adjust COLL pitch to maintain NR 100%. **<u>H160-B</u>** MTOW for training = MTOW with calculated performance minus 200 Kg When failure occurs, nose down attitude minus 20°, keep or adjust COLL pitch if NR < 96%. Reduce nose down continuously to reach Vtoss = 45 Kt. OEI Lo when Vtoss and flight path established. Adjust COLL pitch to maintain NR > 102%. Then identical except NR ≥ 102%.	YES	YES	E	D	D
Climbing and descending turns to specified headings	**<u>EC 175 B Step 3.2</u>** Monitored through Hélionix **<u>H160-B</u>** Identical	YES	NO	D	D	A
Turns with 30 degrees bank, 180 degrees to 360 degrees left and right, by sole reference to instruments	**<u>EC 175 B Step 3.2</u>** Monitored through Hélionix **<u>H160-B</u>** Identical	YES	NO	D	D	A
Autorotative descents	**<u>EC 175 B Step 3.2</u>** VNE power off = VNE power on – 40 Kt Max transient rotor speed (20s) = identical	YES	NO	E	D	B

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
	Max continuous rotor speed = 110 % Minimum continuous rotor speed = 87,5 % Minimum transient rotor speed = identical Aural warning thresholds: NR max = 110 % NR mini = 95 % **<u>H160-B</u>** VNE power off = VNE power on – 35 Kt Max transient rotor speed (20s) = identical Max continuous rotor speed = 109,8 % Minimum continuous rotor speed = 92 % Minimum transient rotor speed = identical Aural warning thresholds: NR max = 109,8 % NR mini = 92 %					
Autorotative landing or power recovery	**<u>EC 175 B Step 3.2</u>** Identical except: At Vy, adjust NR approx. 100% Apply Emergency Cut Off after touch down. **<u>H160-B</u>** Identical except: ENG 1 & 2 off during autorotation descent. At Vy, adjust NR approx. 102%	YES	YES	E	D	B
Landings, various profiles	**<u>EC 175 B Step 3.2</u>** <u>Cat. B:</u> Reduce IAS to reach 40 Kt. R/D of about 300 ft/mn. At 100 ft, reduce IAS of about 30 Kt, until 50 ft above landing site, to enter hover at a height of about 10 ft.	YES	YES	E	D	D

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
	Cat. A Clear area: From LDP, continue the approach while continuously reducing speed and thus bring the aircraft above the landing area to enter hover at 8 ft. Cat. A Ground Helipad: From LDP, continue the approach while continuously reducing speed and thus bring the aircraft above the landing area to enter hover at 8 ft. Cat. A elevated Heliport or Helideck: From LDP, continue the approach. At 50 ft above the landing point, continuously reduce speed to overfly the front edge of the platform at a height around 30 ft and speed about 10 Kt, and thus bring the aircraft above the landing area at a height of about 8 ft. **H160-B** Cat. B: IAS = 50 Kt. At 50 ft, reduce continuously IAS to establish HIGE = 6 ft. Cat. A Clear area: IAS = 50 Kt. At 50 ft, reduce continuously IAS to establish HIGE = 6 ft. Cat. A Ground Helipad: From LDP, reduce continuously IAS to overfly helipad at 20 ft, then continue descent HIGE = 6 ft. Cat. A elevated Heliport or Helideck: TBD					

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Go-around or landing following simulated engine failure before LDP. **Clear airfield**	**EC 175 B Step 3.2** MTOW for training = MTOW Cat. A minus 300 Kg Increase COLL pitch to maintain NR ≥ 96 %. IAS Vtoss. Select OEI Lo. Adjust COLL pitch to maintain NR = 100%. **H160-B** MTOW for training = MTOW with calculated performance minus 200 Kg Identical except: Increase COLL pitch to maintain NR = 102 %. At Vtoss = 55 Kt and flight path established, OEI Lo and maintain NR = 102 %.	YES	YES	E	D	D
Landing following simulated engine failure after LDP. **Clear airfield**	**EC 175 B Step 3.2** MTOW for training = MTOW Cat. A minus 300 Kg Reduce IAS to reach 30 Kt at 50 ft above clear area. At 50 ft, continuously reduce speed while reaching landing area and keeping NR ≈ 100%. Passing the clear edge, reduce IAS (nose up attitude +20° if necessary). Slowly increase COLL pitch to cancel sinking rate. Just before touch down, nose up attitude ≤ 10°. Increase COLL pitch to caution landing. **H160-B** MTOW for training = MTOW with calculated performance minus 200 Kg IAS = 50 Kt. At 50 ft, reduce continuously IAS. Passing the clear area edge, nose up attitude max 15°. Increase COLL pitch when aircraft has tendency to sink. Reduce attitude +5° when hearing audio warning, and increase COLL pitch to caution landing.	YES	YES	E	D	D
Go-around or landing following simulated engine failure before LDP. **Helipad**	**EC 175 B Step 3.2** MTOW for training = MTOW Cat. A minus 300 Kg Increase COLL pitch as necessary while maintaining NR ≥ 96%. Nose down attitude minus 5° to reach Vtoss. At Vtoss, select OEI Lo. Climb 200 ft keeping NR approx. 100%. **H160-B** MTOW for training = MTOW with calculated performance minus	YES	YES	E	D	D

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
	200 Kg Keep or adjust COLL pitch if NR < 96 %.before Vtoss. At Vtoss and flight path established, OEI Lo and maintain NR = 102 %.					
Landing following simulated engine failure after LDP. **Helipad**	**EC 175 B Step 3.2** MTOW for training = MTOW Cat. A minus 300 Kg LDP identical. At 50 ft, continuously reduce speed to overfly the front edge of ground helipad at a height around 30 ft and speed about 10 Kt keeping NR ≈ 100%. Passing ground helipad edge, reduce G/S (Nose up attitude +15° if necessary). Slowly increase COLL pitch to cancel sinking rate. Just before touch down, nose up attitude ≤ 10°. Increase COLL pitch to caution landing. **H160-B** MTOW for training = MTOW with calculated performance minus 200 Kg At LDP, adjust COLL pitch to maintain NR ≥ 102 %. Continuously reduce IAS to overfly the helipad at 20 ft. nose up attitude < +5°; Increase COLL pitch to caution landing.	YES	YES	E	D	D

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Engine	**EC 175 B Step 3.2** Normal procedures: Starting identical (FADEC concept) except : Booster pumps ON Main rotor starts spinning before N1 > 30% Automatic start-up test sequence with message on Master list. Booster pumps test after engine starting. Engine cooling for shutdown = IDLE position ≥ 60 sec. Booster pumps OFF Abnormal procedures: Automatic relighting is possible for N1 > 40% Manual relighting is possible for N1 < 20% ENG OIL LOW PRESS: Identical except check VMS-main page ENG OIL TEMP: Monitor engine parameters on VMS-MAIN page. On ground, T/O is possible. In hover, depart for a forward flight to cool the engine oil. In cruise, increase IAS up to MCP (if possible). Caution still ON, engine OFF. Limit duration of flight. ENG OIL HIGH PRESS: Monitor engine parameters on VMS-MAIN page. Engine IDLE. Booster pumps remain ON. Before landing (if necessary) engine FLIGHT. Limit duration of flight. ENG CHIP: Identical ENG XTALK: Select OEI CT. Check VMS-main page. Monitor engine parameter	YES	YES	C	C	B

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
	split. In case of PWR SPLT display in FLI, join OEI conditions, lowest powered engine (see TRQ) IDLE. Before landing (if necessary) engine FLIGHT. Limit duration of flight. **<u>H160-B</u>** <u>Normal procedures:</u> Starting identical (FADEC concept) except : Main rotor starts spinning before N1 > 25% Engine cooling for shutdown = IDLE position ≥ 30 sec. <u>Abnormal procedures:</u> Manual relighting is possible for N1 < 35% ENG OIL LOW PRESS: Identical except check VMS-main page for H175 ENG OIL HIGH TEMP: Reduce power. If caution still ON, ENG OFF. ENG OIL HIGH PRESS: ENG OFF, then relight before landing if necessary. ENG CHIP: Identical ENG XTALK: Select OEI CT					
Air conditioning (heating,	**<u>EC 175 B Step 3.2</u>** • ECS demisting, • ECS ventilation, • ECS heating,	NO	NO	N/A	N/A	N/A

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
ventilation)	• ECS / ACS cooling **<u>H160-B</u>** Identical					
Pitot/static system	**<u>EC 175 B Step 3.2</u>** Managed and monitored through Hélionix and Integrated Electronic Stand-by Instrument (IESI). **<u>H160-B</u>** Identical	NO	NO	N/A	N/A	N/A
Fuel system	**<u>EC 175 B Step 3.2</u>** <u>Normal procedures:</u> **Booster pumps operation.** <u>Abnormal procedures:</u> LOW FUEL and FUEL FEEDER: Identical except check VMS-FUEL page and booster pumps check. FUEL GAUGING: Identical except check VMS-FUEL page FUEL FILTER: Identical FUEL PRESS: Identical except check booster pumps ON and fuel pressure on VMS-MAIN page. Limit duration of flight. FUEL XFER: Only on H160	NO	YES	C	C	B

<table>
<tr><td colspan="4">Base aircraft: EC 175 B – Helionix Step 3.2

Candidate aircraft: H 160 B – Helionix V9.0</td><td colspan="3">COMPLIANCE METHOD</td></tr>
<tr><td>Maneuvers</td><td>Differences</td><td>FLT CHAR</td><td>PROC CHNG</td><td>Training</td><td>Checking</td><td>Currency</td></tr>
<tr><td></td><td><u>H160-B</u>

<u>Normal procedures:</u>

No Booster pump operation.

<u>Abnormal procedures:</u>

LOW FUEL and FUEL FEEDER:

Identical except check VMS-FUEL page and booster pumps check for H175.

FUEL GAUGING:

Identical except check VMS-FUEL page for H175.

FUEL FILTER: Identical

FUEL PRESS:

Identical except check booster pumps ON and fuel pressure on VMS-MAIN page for H175.

FUEL XFER:

Check usable fuel quantity. Avoid attitude excessive change.</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td><u>EC 175 B Step 3.2</u>

<u>Normal procedures:</u>

EMERG GEN ON after start up.

<u>Abnormal procedures:</u>

BAT OVERHEAT:

Identical except EMERG GEN to OVER and select VMS-ELEC page.

BAT DISCONNECTED:

Identical except check VMS-ELEC page and EMERG GEN to</td><td>YES</td><td>YES</td><td>C</td><td>C</td><td>B</td></tr>
</table>

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Electrical system	OVER. ELEC OVER LOAD: Identical GEN 1 or 2 DISCONNECTED: RST once GEN switch then ON. If caution still ON, GEN switch OFF. EMER GEN switch checked ON. GEN 1 and 2 DISCONNECTED: Reset last GEN failed switch then ON. If RST unsuccessful, last GEN failed switch OFF. Attain VMC if possible. Display VMS-ELEC page. EMER GEN switch OVER within 5 mn. MAIN BUS 1 SHORT CIRCUIT: Check ELEC parameters on VMS-ELEC page. EMER GEN switch OVER within 5 mn. ESS 1 BUS SHORT CIRCUIT: Check ELEC parameters on VMS-ELEC page. ESS 2 BUS SHORT CIRCUIT: Check ELEC parameters on VMS-ELEC page. Flight controls hands-on. Disengage AP1 & AP2 using AFCS fast cut button on cyclic, then re-engage right after AP1 using push button on APCP. Apply EMERGENCY LANDING GEAR EXTENSION before landing. **<u>H160-B</u>** <u>Normal procedures</u> EMERG GEN ON before start up. <u>Abnormal procedures:</u>					

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Electrical system (cont'd)	BAT OVERHEAT: Identical except EMERG GEN to OVER and select VMS-ELEC page for H175. BAT DISCONNECTED: Identical except check VMS-ELEC page and EMERG GEN to OVER. For H175. ELEC OVER LOAD: Identical GEN 1 or 2 DISCONNECTED: Check VMS page. GEN reset then ON. GEN 1 and 2 DISCONNECTED: Established VMC conditions if possible. L/G down. Pull off MR CUT OFF 1 + 2 within 5 mn. MAIN BUS 1 or 2 SHORT CIRCUIT: Some equipment will not be available ESS 1 BUS SHORT CIRCUIT: No corrective action ESS 2 BUS SHORT CIRCUIT: Switch OFF AP2 (fast cut off and AP1 ON). SHD 1 (or 2) BUS SHORT CIRCUIT: Reset BAT 1 (or 2) then ON					
	<u>EC 175 B Step 3.2</u> <u>Normal procedures:</u> HYD aux pump switch to AUTO position after manual pre-start	YES	YES	C	C	B

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Hydraulic system	test. <u>Abnormal procedures:</u> HYD 1 LOW PRESS: Identical except limit bank angle to 45°, check HYD aux pump on AUTO position, apply emergency L/G extension procedure. Limit duration of flight. MAIN PRESS DEG HYD2: Identical except limit bank angle to 45°, check HYD aux pump on AUTO position, apply emergency L/G extension procedure, check VMS-HYDR page and HYD aux pump. Limit duration of flight. AUX PRESS DEG HYD2: Check main and aux press on VMS-HYDR PAGE; If below 110 bar, HYD aux pump OFF. If caution remains lit, apply emergency L/G extension procedure. Check brake pressure gauge. Limit duration of flight. LOW PRESS HYD2: Identical except limit bank angle to 45°, HYD aux pump OFF position, apply emergency L/G extension procedure. Limit duration of flight. HYD HIGH PRESSURE: Identical except monitor pressure and temperature on VMS-HYDR page, extend normally L/G. Limit duration of flight. AUX HIGH PRESS HYD2: L/G normal extension. HYD aux pump OFF. Check caution OFF. Check VMS-HYDR page. Monitor Aux HYD pressure (drop to zero). Monitor brake pressure before landing. Set HYD aux pump to TEST for few seconds in order to re-charge brake accumulator, then return to OFF position. Limit duration of flight.					

<table>
<tr><td colspan="4">Base aircraft: EC 175 B – Helionix Step 3.2
Candidate aircraft: H 160 B – Helionix V9.0</td><td colspan="3">COMPLIANCE METHOD</td></tr>
<tr><td>Maneuvers</td><td>Differences</td><td>FLT CHAR</td><td>PROC CHNG</td><td>Training</td><td>Checking</td><td>Currency</td></tr>
<tr><td>Hydraulic system (cont’d)</td><td>BRAKE LOW PRESS HYD2:

Check HYD aux pump AUTO. Check brake pressure gauge.

HYD1 LOW LEVEL: Identical

HYD2 LOW LEVEL:

Check HYD2 circuit on VMS-HYDR page. Apply Emergency L/G extension procedure. Be prepared for MAIN PRESS DEG HYD2 procedure and possibly LOW PRESS HYD2. Check brake pressure gauge before landing. On ground, limit use of brake as much as possible. Limit duration of flight.

HYD1 HIGH TEMP:

Normal L/G extension. BYP1 switch OFF position. Check VMS-HYDR page. Monitor temperature. Limit bank angle to 45°. Avoid abrupt maneuvers. Limit duration of flight.

HYD2 HIGH TEMP:

Normal L/G extension. BYP2 switch OFF position. Check VMS-HYDR page. Monitor temperature. Limit bank angle to 45°. Avoid abrupt maneuvers. Check caution light OFF after approx. 1 mn. If caution light remains ON after 1 mn, monitor temperature. HYD aux pump to OFF if caution light remains ON after 1 mn. Apply LOW PRESS HYD2. Limit duration of flight.

AUX PUMP OVHT HYD2: Only on H175

L/G EMER OVHT HYD2; Only on H175

<u>H160-B</u>

<u>Normal procedures:</u>

HYD aux pump switch to OFF position after flight controls check.

<u>Abnormal procedures:</u></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
	HYD 1 LOW PRESS: Identical except limit bank angle to 45°, check HYD aux pump on AUTO position, apply emergency L/G extension procedure for H175. MAIN PRESS DEG HYD2: Identical except limit bank angle to 45°, check HYD aux pump on AUTO position, apply emergency L/G extension procedure, check VMS-HYDR page and HYD aux pump for H175. EMER PRESS DEG HYD2: Pressure ≤ 140 bar. LOW PRESS HYD2: Identical except limit bank angle to 45°, HYD aux pump OFF position, apply emergency L/G extension procedure for H175. HYD HIGH PRESSURE: Identical except monitor pressure and temperature on VMS-HYDR page, extend normally L/G for H175. AUX HIGH PRESS HYD1: On ground only. Aux pump OFF. HYD1 TAIL LOW PRESS: Pressure < 85 bar in LH tail circuit. Be prepared for HYD1 LOW PRESS. HYD1 LOW LEVEL: Identical HYD2 LOW LEVEL: Avoid abrupt maneuver. Be prepared for MAIN PRESS DEG HYD2 then LOW PRESS HYD2.					

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Hydraulic system (cont'd)	HYD1 HIGH TEMP: HYD1 OFF. Avoid abrupt maneuvers. HYD2 HIGH TEMP: No corrective action. HYD LOW TEMP: Only on ground. ENG 1 & 2 keep IDLE.					
Flight control and Trim-system	**EC 175 B Step 3.2** Only one actuator on COLL pitch. **H160-B** Identical except two actuators on COLL pitch	NO	YES	D	D	B
Anti and de-icing system	**EC 175 B Step 3.2** Not equipped **H160-B** Not equipped	N/A	N/A	N/A	N/A	N/A
Auto-Pilot/Flight Director	**EC 175 B Step 3.2** No automatic T/O modes and GTC, Height Hover mode 3 axis. **H160-B** Identical except automatic T/O modes and GTC, Height Hover mode 4 axis	YES	YES	D	D	C
Stability augmentation devices	**EC 175 B Step 3.2** AFCS processing units partitions of Hélionix AMC'S **H160-B** Identical	YES	NO	D	D	A

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Weather radar, radio altimeter, transponder	**EC 175 B Step 3.2** Monitored and managed through Hélionix **H160-B** Identical except manual RADALT test during Pre-flight test.	NO	YES	C	B	A
Navigation system	**EC 175 B Step 3.2** CMA 9000 and Hélionix displays **H160-B** Identical (CMA 9000)	NO	NO	N/A	N/A	N/A
Landing gear system	**EC 175 B Step 3.2** HYD system **H160-B** ELEC system	YES	YES	C	C	B
Auxiliary power unit (declutch mode)	**EC 175 B Step 3.2** Declutch mode. **H160-B** Not equipped	NO	NO	N/A	N/A	N/A
Radio, navigation equipment, instruments flight management system	**EC 175 B Step 3.2** Performed through Hélionix **H160-B** Identical	NO	NO	N/A	N/A	N/A
Fire drills (including evacuation if applicable)	**EC 175 B Step 3.2** ENG FIRE on ground and in flight: Booster pumps OFF	NO	YES	D	D	B

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
	H160-B ENG FIRE on ground and in flight: Identical except booster pumps management					
Smoke control and removal	**EC 175 B Step 3.2** On ground or in hover, over a possible landing site: Pull AFT EMER CUT OFF gang bar. Land Immediately. In flight when immediate landing is impossible: Attain VMC if possible. ECS OFF. Open bad weather windows. Check that smoke is not caused by upper utility light. Pull AFT EMER CUT OFF gang bar. Proceed in turn with list of steps intended to identify and isolate the faulty bar. Wait long enough between steps to ensure that no smoke reappears. **H160-B** Same philosophy	NO	YES	C	C	B
Engine failures, shut down and restart at a safe height	**EC 175 B Step 3.2** Identical except cautions disappears from ML after ENG switch to OFF. Only ENG OFF label remains on ML. Automatic relighting is possible for N1 > 40% Manual relighting is possible for N1 < 20% **H160-B** Identical except cautions remain on ML after ENG switch to OFF. Only ENG OFF label remains on ML for flame out only. Two red bars light appear on each side of ENG switch on overhead panel and VMS. Manual relighting is possible for N1 < 35%	NO	YES	D	D	C
Fuel dumping (simulated)	**EC 175 B Step 3.2** Not equipped **H160-B**	N/A	N/A	N/A	N/A	N/A

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
	Not equipped					
Tail rotor control failure (if applicable)	**<u>EC 175 B Step 3.2</u>** N/A **<u>H160-B</u>** N/A	N/A	N/A	N/A	N/A	N/A
Tail rotor loss (if applicable) *Helicopter shall not be used for this exercise*	**<u>EC 175 B Step 3.2</u>** <u>Loss of tail rotor thrust:</u> Apply immediately autorotation procedure. Shut down engines. Maintain highest possible forward ground speed. Control yawing using wheel brakes, immediately after touch down. Pull AFT EMER CUT OFF gang bar if appropriate. **<u>H160-B</u>** Same philosophy	YES	YES	E	D	B
Transmission malfunctions	**<u>EC 175 B Step 3.2</u>** <u>Abnormal procedures:</u> MGB LOW PRESS (Warning) : Immediately reduce power to max torque 50%. ECS OFF. Check MGB oil pressure ≤ 0,5 bar. Land ASAP. MGB MAIN OIL: Reduce power to max torque 50%. Confirm MGB main and Backup oil pressure on VMS-XMSN page. Monitor MGB temperature. Case 1: Limit duration of flight if MGB tp° remains steady. Case 2: Limit duration of flight if MGB tp° increases. Be prepared for MGB HIGH TEMP procedure. MGB LOW PRESS (Caution): Adjust power to max torque 50%. Confirm MGB main and Backup oil pressure on VMS-XMSN page. Be prepared for MGB LOW PRESS (Warning) procedure.	NO	YES	D	D	B

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
Transmission malfunctions (cont'd)	MGB BACKUP OIL: Confirm MGB main and Backup oil pressure on VMS-XMSN page. Limit duration of flight. MGB HIGH TEMP: Monitor MGB temperature on VMS-XMSN page. Join IAS ≈ 130 Kt for air cooling. Case 1: If caution goes out, Limit duration of flight. Case 2: If MGB HIGH TEMP, reduce power to max torque 50%. Closely monitor MGB tp°. If caution goes out, refer to case 1. Else, if MGB tp° remains stabilized below 200°C, Limit duration of flight. If MGB tp° does not stabilized, land immediately as soon it reaches 200°C. XMSN CHIP: Identify CHIP light on VMS-XMSN page. Refer to different cases, CHIP in MGB, TGB or IGB. IGB HIGH TEMP: Monitor IGB tp° on VMS-XMSN page. Avoid extended Hover flight. If caution goes out, Limit duration of flight. If caution remains ON, land ASAP. TGB HIGH TEMP: Monitor TGB tp° on VMS-XMSN page. Avoid extended Hover flight. If caution goes out, Limit duration of flight. If caution remains ON, land ASAP. ROTOR BRAKE: Identical **<u>H160-B</u>** <u>Abnormal procedures:</u> MGB LOW PRESS : Immediately IAS reduce to Vy. Emergency landing check for					

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
	immediate landing. MGB MAIN PRESS: Reduce IAS to Vy. Be prepared for MGB LOW PRESS. Limit duration of flight. MGB HIGH TEMP: IAS establish to 120 Kt for cooling. If caution persists, reduce to Vy. Land ASAP, else limit duration of flight. MGB CHIP: Reduce IAS to Vy. Limit duration of flight. TGB CHIP: Avoid extended hover flight. Be prepared for TGB HIGH TEMP. Limit duration of flight. TGB HIGH TEMP: IAS establish to 120 Kt for cooling. If caution persists, reduce to Vy. Land ASAP, else continue flight. ROTOR BRAKE: Identical					
Other emergency procedures: Engine failure simulation	**EC 175 B Step 3.2** The training function is used to simulate the helicopter behavior in case of a single engine flame-out in order for the crew to train for the operational procedures to be applied if the real event occurs. The engine failure is simulated by decreasing simultaneously the power of both engines to share equally the required OEI power. The ENGINES TRAINING system enables OEI flight training to be conducted using non-damaging power levels, provided that the weights have been reduced accordingly. The maximum real OEI rating can be used in case an actual engine failure occurs while using training mode. **OEI power simulation:**	NO	YES	D	D	B

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
	Both engines are running and provide the OEI High power rating divided by two on the flight display. One engine is simulated as providing the full OEI power and the other one is simulated as having failed. **<u>H160-B</u>** Identical (same philosophy)					
Other emergency procedures: Major governing failure	**<u>EC 175 B Step 3.2</u>** FADEC FAIL: Identical except amber warning in master list **<u>H160-B</u>** FADEC FAIL: Identical except red warning in master list	NO	YES	C	C	B
Instrument take-off	**<u>EC 175 B Step 3.2</u>** Performed and monitored through CMA900, AFCS and Hélionix **<u>H160-B</u>** Identical	NO	NO			
Engine failure during departure	**<u>EC 175 B Step 3.2</u>** Performed and monitored through CMA900, AFCS and Hélionix **<u>H160-B</u>** Identical	NO	NO			
Holding procedures	**<u>EC 175 B Step 3.2</u>** Performed and monitored through CMA900, AFCS and Hélionix **<u>H160-B</u>** Identical	NO	NO			
ILS-approaches	**<u>EC 175 B Step 3.2</u>**	NO	NO			

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
down to CAT 1 decision height	Performed and monitored through CMA900, AFCS and Hélionix **H160-B** Identical					
ILS-approaches manually, without flight director	**EC 175 B Step 3.2** Performed and monitored through CMA900, AFCS and Hélionix **H160-B** Identical	NO	NO			
ILS-approaches manually, with flight director	**EC 175 B Step 3.2** No flight director **H160-B** No flight director	NO	NO			
ILS-approaches with coupled autopilot	**EC 175 B Step 3.2** Performed and monitored through CMA900, AFCS and Hélionix **H160-B** Identical	NO	NO			
Non-precision approach	**EC 175 B Step 3.2** Performed and monitored through CMA900, AFCS and Hélionix **H160-B** Identical	NO	NO			
GNSS approaches with vertical guidance (LPV, LNAV/VNAV)	**EC 175 B Step 3.2** Performed and monitored through CMA900, AFCS and Hélionix **H160-B** Identical	NO	NO			

Base aircraft: EC 175 B – Helionix Step 3.2 **Candidate aircraft: H 160 B – Helionix V9.0**				**COMPLIANCE METHOD**		
Maneuvers	Differences	FLT CHAR	PROC CHNG	Training	Checking	Currency
GNSS approaches without vertical guidance (LNAV)	**EC 175 B Step 3.2** Performed and monitored through CMA900, AFCS and Hélionix **H160-B** Identical	NO	NO			
Go-around with all engines operating	**EC 175 B Step 3.2** Performed and monitored through CMA900, AFCS and Hélionix **H160-B** Identical	NO	NO			
Missed approach procedures	**EC 175 B Step 3.2** Performed and monitored through CMA900, AFCS and Hélionix **H160-B** Identical	NO	NO			
Go-around with one engine inoperative	**EC 175 B Step 3.2** Performed and monitored through CMA900, AFCS and Hélionix **H160-B** Identical	NO	NO			
Recovery from unusual attitudes	**EC 175 B Step 3.2** Performed and monitored through CMA900, AFCS and Hélionix **H160-B** Identical	NO	NO			

3. Optional Specific Equipment

These optional equipment items correspond AIRBUS designed items (AH TC holder).

3.1 ODR table for optional specific equipment to be considered for the Type Rating

Refer to the corresponding Flight Manual to ensure that the optional item is approved for a given model.				**COMPLIANCE METHOD**		
Title	**RFM section**	FLT CHAR	PROC CHNG	Training	Checking	Currency
Float type undercarriage/Emergency floatation gear		YES	YES	B	A	B
All other optional items (ADELT…)	-	NO	YES	B	A	n/a

3.2 ODR table for optional specific equipment to be considered in the frame of mission/operational pilot training

Refer to the corresponding Flight Manual to ensure that the optional item is approved for a given model.				**COMPLIANCE METHOD**		
Title	**RFM section**	FLT CHAR	PROC CHNG	Training	Checking	Currency