# มาตรฐานอาชีพและคุณวุฒิวิชาชีพ

# Occupational Standard and Professional Qualifications

## Of Aircraft Mechanics

จัดทำโดย Thailand Professional Qualification Institute (Public Organization)

**1. ชื่อมาตรฐานอาชีพ**

Of Aircraft Mechanics

**2. ประวัติการปรับปรุงมาตรฐาน**

1/2021

**3. ทะเบียนอ้างอิง (Imprint)**

N/A

**4. ข้อมูลเบื้องต้น**

Basics need for establishing a professional qualification standard for an occupation of an aircraft mechanics arises from the highly demands and supplys of social, industial economic, and personnal needs.

**5. ประวัติการปรับปรุงมาตรฐานในแต่ละครั้ง**

1/2021

**6. ครั้งที่**

- Review of qualifications according to the 8-level professional qualifications framework.
- Review of qualification pathway.

**7. คุณวุฒิวิชาชีพที่ครอบคลุม (Professional Qualifications included)**

สาขาวิชาชีพการบิน

สาขางานเทคนิคและฝึกอบรม

Aircraft Mechanics : Helicopters ช่างอากาศยาน (เฮลิคอปเตอร์) ระดับ 4

**8. คุณวุฒิวิชาชีพที่เกี่ยวข้อง (Related Professional Qualifications)**

N/A

**9. หน่วยสมรรถนะทั้งหมดในมาตรฐานอาชีพ (List of All Units of Competence within this Occupational Standards)**

| รหัสหน่วยสมรรถนะ | เนื้อหา |
|---|---|
| 101401 | Use computers in aviation maintenance-related integrated logistic support. |
| 101403 | Minor repair for aircraft electrical hardware or parts. |
| 101404 | Inspect, test and troubleshoot aircraft hydro-mechanical and landing gear. |
| 101405 | Inspect, test and troubleshoot aircraft pneumatic systems and components. |
| 101407 | Inspect, test and troubleshoot piston engine systems and components. |
| 101409 | Inspect aircraft hydro-mechanical, mechanical, gaseous and landing gear. |
| 101410 | Inspect gas turbine engine systems and components. |
| 101411 | Test and troubleshoot aircraft hydro-mechanical, gaseous and landing gear. |
| 101413 | Test and troubleshoot gas turbine engine systems and components. |
| 101414 | Repair and/or overhaul aircraft piston engine crankcase assembly components. |
| 101415 | Maintain aircraft vapour cycle air conditioning systems. |
| 102401 | Inspect, test and troubleshoot rotary wing rotor and control systems and components. |
| 103302 | Remove and install advanced aircraft electrical system components. |
| 103401 | Inspect, test and troubleshoot basic aircraft electrical systems and components. |

103402 Inspect aircraft electrical systems and components.

**10. ระดับคุณวุฒิ**

**10.1 สาขาวิชาชีพการบิน สาขางานเทคนิคและฝึกอบรม Aircraft Mechanics : Helicopters ช่างอากาศยาน (เฮลิคอปเตอร์) ระดับ 4**

**คุณลักษณะของผลการเรียนรู้ (Characteristics of Outcomes)**

A person with specialize skill and technique who is capable working as an aircraft mechanic. The one can handle much more complicated tasks by applying theory, basic knowledge, and necessary tools by his own experiences.

**Characteristics of Outcomes**

Capable of inspecting, testing, and analyzing all minor and major component of the aircraft through a technical manual.

**การเลื่อนระดับคุณวุฒิวิชาชีพ (Qualification Pathways)**

1. The minimum age for person who wants to qualify this level is 18 years old.
2. Legitimates one of the following:

2.1 Holds a minimum Vocational Certificate or equivalence, and at least six years working experiences in aircraft maintenance with an official verification letter.

2.2 Holds a High Vocational Certificate, completed in aircraft maintenance course and at least two years working experiences in aircraft maintenance with an official verification letter.

2.3 Holds a High Vocational Certificate or equivalence, and at least four years working experiences in aircraft maintenance with an official verification letter.

2.4 Holds a Bachelor's Degree, completed in aircraft maintenance course or equivalence and at least two years working experiences in aircraft maintenance with an official verification letter.

2.5 Holds a Bachelor's Degree or equivalence, and at least three years working experiences in aircraft maintenance with an official verification letter.

2.6 Holds a Professional Qualification Certificate level 3, and at least two years experiences in aircraft maintenance with an official verification letter.

**หลักเกณฑ์การต่ออายุหนังสือรับรองมาตรฐานอาชีพ**

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**กลุ่มบุคคลในอาชีพ (Target Group)**

Aircraft Mechanics: Helicopters

**หน่วยสมรรถนะ (หน่วยสมรรถนะทั้งหมดของคุณวุฒิวิชาชีพนี้)**

101401 Use computers in aviation maintenance-related integrated logistic support.

101403 Minor repair for aircraft electrical hardware or parts.

101404 Inspect, test and troubleshoot aircraft hydro-mechanical and landing gear.

101405 Inspect, test and troubleshoot aircraft pneumatic systems and components.

101407 Inspect, test and troubleshoot piston engine systems and components.

101409 Inspect aircraft hydro-mechanical, mechanical, gaseous and landing gear.

101410 Inspect gas turbine engine systems and components.

101411 Test and troubleshoot aircraft hydro-mechanical, gaseous and landing gear.

101413 Test and troubleshoot gas turbine engine systems and components.

101414 Repair and/or overhaul aircraft piston engine crankcase assembly components.

101415 Maintain aircraft vapour cycle air conditioning systems.

102401 Inspect, test and troubleshoot rotary wing rotor and control systems and components.

103302 Remove and install advanced aircraft electrical system components.

103401 Inspect, test and troubleshoot basic aircraft electrical systems and components.

103402 Inspect aircraft electrical systems and components.

**ตารางแผนผังแสดงหน้าที่**

**1. ตารางแสดงหน้าที่ 1**

ประกาศใช้ ณ 13/08/2564

**ตาราง 1 : FUNCTIONAL MAP แสดง KEY PURPOSE , KEY ROLES , KEY FUNCTION**

| ความมุ่งหมายหลัก Key Purpose | บทบาทหลัก Key Roles | | หน้าที่หลัก Key Function | |
|---|---|---|---|---|
| คำอธิบาย | รหัส | คำอธิบาย | รหัส | คำอธิบาย |
| To promote and support aircraft maintenance of a aircraft mechanics group | 10 | Aircraft Mechanics | 101 | Aircraft Mechanics: Airplane |
| | | | 102 | Aircraft Mechanics Helicopter |
| | | | 103 | Aircraft Mechanics Avionics |

**คำอธิบาย** ตารางแผนผังแสดงหน้าที่เป็นแผนผังที่ใช้วิเคราะห์หน้าที่งานเพื่อให้ได้หน้าที่หลัก (Key Function)

**2. ตารางแสดงหน้าที่ 1 (ต่อ)**

ประกาศใช้ ณ 13/08/2564

**ตาราง 2 : FUNCTIONAL MAP แสดง KEY FUNCTION , UNIT OF COMPETENCE , ELEMENT OF COMPETENCE**

| หน้าที่หลัก Key Function | | หน่วยสมรรถนะ Unit of Competence | | หน่วยสมรรถนะย่อย Element of Competence | |
|---|---|---|---|---|---|
| **รหัส** | **คำอธิบาย** | **รหัส** | **คำอธิบาย** | **รหัส** | **คำอธิบาย** |
| 101 | Aircraft Mechanics: Airplane | 101401 | Use computers in aviation maintenance-related integrated logistic support. | 10140 1.01 | Use word processing, spreadsheets, and databases software. |
| | | | | 101401 .02 | Use project-planning software, internet and store backup copies of data. |
| | | 101403 | Minor repair for aircraft electrical hardware or parts. | 10140 3.01 | Interpret specifications and organise materials. |
| | | | | 101403 .02 | Minor repair for electrical components or parts. |
| | | | | 101403 .03 | Test / repaired components or parts. |
| | | 101404 | Inspect, test and troubleshoot aircraft hydro-mechanical and landing gear. | 01404. 02 | Inspect landing gear systems and components. |
| | | | | 101404 .01 | Inspect hydro-mechanical systems and components. |
| | | | | 101404 .03 | Test hydro-mechanical and landing gear systems. |
| | | | | 101404 .04 | Troubleshoot hydro-mechanical and landing gear systems. |
| | | 101405 | Inspect, test and troubleshoot aircraft pneumatic systems and components. | 10140 5.01 | Inspect and test pneumatic systems and components. |
| | | | | 101405 .02 | Troubleshoot pneumatic systems. |
| | | 101407 | Inspect, test and troubleshoot piston engine systems and components. | 10140 7.01 | Inspect and test piston engine system and components. |
| | | | | 101407 .02 | Troubleshoot piston engine system. |
| | | 101409 | Inspect aircraft hydro-mechanical, mechanical, gaseous and landing gear. | 10140 9.01 | Inspect hydro-mechanical systems and components. |
| | | | | 101409 .02 | Inspect gaseous systems and components. |
| | | | | 101409 .03 | Inspect mechanical and landing gear systems and components. |
| | | | | 101409 .04 | Inspect mechanical systems and components. |
| | | 101410 | Inspect gas turbine engine systems and components. | 10141 0.01 | Inspect gas turbine engine systems and components. |

| หน้าที่หลัก Key Function | | หน่วยสมรรถนะ Unit of Competence | | หน่วยสมรรถนะย่อย Element of Competence | |
|---|---|---|---|---|---|
| รหัส | คำอธิบาย | รหัส | คำอธิบาย | รหัส | คำอธิบาย |
| 101 | Aircraft Mechanics: Airplane | 101410 | Inspect gas turbine engine systems and components. | 10141 0.02 | Inspect gas turbine engine components. |
| | | 101411 | Test and troubleshoot aircraft hydro-mechanical, gaseous and landing gear. | 10141 1.01 | Test hydro-mechanical, mechanical, gaseous and landing gear systems and components. |
| | | | | 101411 .02 | Troubleshoot hydro-mechanical, mechanical, gaseous and landing gear systems and components. |
| | | 101413 | Test and troubleshoot gas turbine engine systems and components. | 10141 3.01 | Test gas turbine engine system. |
| | | | | 101413 .02 | Troubleshoot gas turbine engine system. |
| | | 101414 | Repair and/or overhaul aircraft piston engine crankcase assembly components. | 10141 4.01 | Determine requirements. |
| | | | | 101414 .02 | Dismantle and inspect piston engine crankcase assembly components/parts. |
| | | | | 101414 .03 | Repair and/or modify piston engine crankcase assembly components or parts. |
| | | | | 101414 .04 | Assemble, test and adjust piston engine crankcase assembly components. |
| | | 101415 | Maintain aircraft vapour cycle air conditioning systems. | 10141 5.01 | Inspect vapour cycle air conditioning systems. |
| | | | | 101415 .02 | Test vapour cycle air conditioning systems. |
| | | | | 101415 .03 | Troubleshoot vapour cycle air conditioning. |
| | | | | 101415 .04 | Remove vapour cycle air conditioning system components. |
| | | | | 101415 .05 | Install vapour cycle air conditioning system components. |
| 102 | Aircraft Mechanics Helicopter | 102401 | Inspect, test and troubleshoot rotary wing rotor and control systems and components. | 10240 1.01 | Inspect and ground rotor and rotor control systems and components. |
| | | | | 102401 .02 | Troubleshoot rotor and rotor control systems. |
| 103 | Aircraft Mechanics Avionics | 103302 | Remove and install advanced aircraft electrical system components. | 10330 2.01 | Remove AC and DC aircraft electrical system components. |
| | | | | 103302 .02 | Install AC and DC aircraft electrical system components. |
| | | 103401 | Inspect, test and troubleshoot basic aircraft electrical systems and components. | 10340 1.01 | Inspect DC aircraft electrical systems and components. |

| หน้าที่หลัก Key Function | | หน่วยสมรรถนะ Unit of Competence | | หน่วยสมรรถนะย่อย Element of Competence | |
|---|---|---|---|---|---|
| **รหัส** | **คำอธิบาย** | **รหัส** | **คำอธิบาย** | **รหัส** | **คำอธิบาย** |
| 103 | Aircraft Mechanics Avionics | 103401 | Inspect, test and troubleshoot basic aircraft electrical systems and components. | 10340 1.02 | Test/adjust DC aircraft electrical systems. |
| | | | | 103401 .03 | Troubleshoot DC aircraft electrical systems. |
| | | 103402 | Inspect aircraft electrical systems and components. | 10340 2.01 | Inspect electrical systems and components. |
| | | | | 103402 .02 | Inspect electrical components. |

**คำอธิบาย**

ตารางแผนผังแสดงหน้าที่ (ต่อ) เป็นแผนผังที่ใช้วิเคราะห์หน้าที่งานหลังจากได้หน้าที่หลัก (Key Function) เพื่อให้ได้ หน่วยสมรรถนะ (Unit of Competence) และหน่วยสมรรถนะย่อย (Element of Competence)

**1. รหัสหน่วยสมรรถนะ** 101401

**2. ชื่อหน่วยสมรรถนะ** Use computers in aviation maintenance-related integrated logistic support.

**3. ทบทวนครั้งที่** N/A

**4. สร้างใหม่** ☑ **ปรับปรุง** ☐

**5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)**

7232 Aircraft engine mechanics and fitters

**6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)**

This unit of competency requires application of skills and knowledge relating to the use of the internet, word processing, spreadsheets, databases and project planning software to perform tasks relating to integrated logistic support (ILS) activities associated with aviation maintenance, including aircraft technical records and compliance with regulatory requirements relating to the compilation and safeguarding of data during scheduled or unscheduled maintenance.

**7. สำหรับระดับคุณวุฒิ**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

**8. กลุ่มอาชีพ (Sector)**

10 Aircraft Mechanics

**9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)**

101 Aircraft Maintenance: Airplane
102 Aircraft Maintenance:Helicopter
103 Aircraft Maintenance: Avionic

**10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)**

ICAO Doc 7192 / EASA Part 66

**11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)**

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101401.01<br>Use word processing, spreadsheets, and databases software. | 101401.01.01 Correspondence is drafted using word processing software and spreadsheets used within the enterprise are used to obtain data.<br>101401.01.02 Databases used for maintenance-related ILS activities within the enterprise are used to obtain data. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |
| 101401.02<br>Use project-planning software, internet and store backup copies of data. | 101401.02.01 Project-planning software is used to monitor the progress of a task and regulatory information is obtained from applicable internet websites.<br>101401.02.02 Backup copies of data are made and are updated as required by regulatory requirements, and organisational policies and procedures. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

**12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)**

N/A

**13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)**

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

**14. หลักฐานที่ต้องการ (Evidence Guide)**

**(a) Performance Evidence**

Evidence required to demonstrate competency in this unit should be of interest and meet all requirements of the elements and performance criteria under the specified conditions assessment at least once, and must include:

- Use of word processing software.
- Development and use of spreadsheets.
- Populating and obtaining data from databases.
- Use of project planning software.
- Use of the internet to obtain regulatory and technical data.

**(b) Knowledge Evidence**

Evidence required to demonstrate competency in this unit should be of interest and meet all requirements of the elements and performance criteria and include knowledge of:

- Types of word processing software commonly used in the maintenance-related ILS environment.
- Development and use of spreadsheets.
- Database usage in the maintenance-related ILS environment.
- Use of project planning software and the types of task management software used by maintenance organisations.
- Internet websites relating to regulatory requirements, standards and specifications.
- Use of internet search engines to obtain technical and commercial data.
- Procedures for backing up and storing data.

**(c) Assessment recommendation**

N/A

**Assessmen methods**

**15. ขอบเขต (Range Statement)**

**(a) Recommendation**

This field allows different environments and working conditions that can affect the performance. the essential operating conditions that may be present (depending on the work situation, accessibility requirements, the candidate of the topic, and local industry and regional contexts) are included.

| | |
|---|---|
| **ILS-related spreadsheet applications include:** | • Costing a maintenance task or proposed modification.<br>• Assessing the economic value of a proposed repair.<br>• Costing a training program for maintenance personnel.<br>• Management of items of aeronautical product both on and off aircraft.<br>• Management of life critical parts.<br>• Maintenance programs. |
| **Databases used for maintenance-related ILS activities include:** | • Life cycle costing data.<br>• Baselines for reliability, availability and maintainability.<br>• Life support analysis record data.<br>• Personnel task authorisations and training records.<br>• Management of items of aeronautical product both on and off aircraft.<br>• Management of life critical parts.<br>• Maintenance programs. |
| **Maintenance-related ILS tasks using project planning software include:** | • Planning an aircraft maintenance task.<br>• Planning a modification program.<br>• Planning a maintenance personnel training program. |
| **Technical data includes:** | • Standards.<br>• Specifications.<br>• Vendor data on materials, piece parts and components.<br>• Engineering data. |

| | |
|---|---|
| **Required media for backup copies of data are specified in:** | • Regulations.<br>• Organisational policies and procedures.<br>• Contract requirements. |
| **Regulatory requirements, and organisational policies and procedures include:** | • Civil Aviation Safety Regulations (CASRs), Manuals of Standards and associated Acceptable Means of Compliance and Guidance Material.<br>• Maintenance organisation expositions.<br>• Continuing airworthiness management organisation expositions.<br>• Aircraft maintenance programs.<br>• Quality manuals.<br>• Procedures manuals.<br>• Work instructions Manual.<br>• Defence Regulations and instructions.<br>• Standing instructions.<br>• Maintenance management plan.<br>• Applicable overseas airworthiness regulations, such as Federal Aviation Regulations and European Aviation Safety Regulations. |

**(b) Description**

**N/A**

**16. หน่วยสมรรถนะร่วม (ถ้ามี)**

N/A

**17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)**

N/A

**18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)**

The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.This unit may be assessed on the job, off the job or a combination of both inside and outside of work. Where assessment occurs outside of work, ie, the candidate is not in productive work, an appropriate simulation should be used in the range of conditions of the workplace reflects realistic situations involving the use of computers in related activities ILS maintenance.

• The candidate must have access to all equipment, materials and documentation required and must be permitted to refer to all relevant site procedures, product specifications and manufacturing, codes, standards, manuals and reference materials. The assessment environment should not harm the candidate.

• Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including the necessary knowledge, and be able to apply competition in new and different situations and contexts.

• The assessors must meet a series of tests that is valid, sufficient, current and authentic. The preferred method is the records of Competition Registration Maintenance Management. Where the individual has no record of proficiency testing can be obtained through a variety of ways, including direct observation, reports supervisor, project work, samples and interrogation.

• Interrogation techniques should not require language, reading, writing and arithmetic in addition to those required in this competition unit.

• The assessors must meet the requirements of the National Education and Vocational Regulator.

**1. รหัสหน่วยสมรรถนะ** 101403

**2. ชื่อหน่วยสมรรถนะ** Minor repair for aircraft electrical hardware or parts.

**3. ทบทวนครั้งที่** N/A

**4. สร้างใหม่** ☑ **ปรับปรุง** ☐

**5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)**

7232 Aircraft engine mechanics and fitters

**6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)**

This skill unit requires the use of workforce skills and knowledge of standards and cabling specifications to manufacture aircraft electrical looms, harnesses and cables in hangars and aircraft maintenance workshops during maintenance scheduled or unscheduled. The work can be done individually or as part of a team.

**7. สำหรับระดับคุณวุฒิ**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

**8. กลุ่มอาชีพ (Sector)**

7232 Aircraft Mechanics

**9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)**

N/A

**10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)**

ICAO Doc 7192 / EASA Part 66

**11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)**

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101403.01<br>Interpret specifications and organise materials. | 101403.01.01 Specifications are interpreted to determine the dimensions and procedure for fabrication.<br>101403.01.02 Appropriate materials, tools and equipment are selected and prepared for the particular specification requirements. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |
| 101403.02<br>Minor repair for electrical components or parts. | 101403.02.01 Assembly or fabrication jigs, where applicable, are aligned to ensure accurate fabrication of components.<br>101403.02.02 Components or parts are repaired in accordance with required specifications while observing all relevant work health and safety (WHS) requirements including the use of material safety data sheets (MSDS) and personal protective equipment (PPE). | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |
| 101403.03<br>Test / repaired components or parts. | 101403.03.01 Test equipment and/or rigs are used, where applicable, to confirm serviceability of finished components.<br>101403.03.02 Repaired components are tagged, sealed and packaged within specified procedures. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

**12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)**

101309 Remove and install miscellaneous aircraft electrical hardware/components

101311 Use electrical test equipment

**13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)**

(ก) ความต้องการด้านทักษะ

EASA Part 66: Module 6Materials and Hardware

EASA Part 66: Module 7A Maintenance Practices

(ข) ความต้องการด้านความรู้

EASA Part 66: Module 6Materials and Hardware

EASA Part 66: Module 7A Maintenance Practices

**14. หลักฐานที่ต้องการ (Evidence Guide)**

**(a) Performance Evidence**

• Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria under the specified conditions of assessment, and must include:

• Applying relevant WHS practices, including the use of PPE and reference to MSDS.

• Using approved repair/fabrication procedures and processes relating to electrical cables, harnesses, antenna leads and aerial components.

• Recognising the integrity/security of electrical component crimps, wire wrapping, joints, and plug/connector pins.

• Constructing cables, harnesses and looms, including wire marking, to approved industry standards.

• Performing component testing to assess post-construction serviceability. The underlying skills inherent in this unit should be transferable into other areas that require similar techniques. It is essential that the general aspects of material specification and selection, measurement and fabrication/manufacture are related to specific aircraft component applications.

**(b) Knowledge Evidence**

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

• Component and system operation.

• Aircraft wiring specifications and standards.

• Standard repair methods for:

• Electrical cables.

• lignition harnesses.

• Fire warning system harnesses.

• Coaxial cables, such as antenna leads.

• Aerial components.

• Electrical plugs and connectors.

• Soldering methods.

• Fabrication methods for the above wiring and cables.

• Wire marking methods.

• Assembly of electrical cables into wiring looms.

• Relevant WHS procedures.

• How to obtain relevant MSDS.

• Relevant maintenance manuals.

• Relevant regulatory requirements and standard procedures.

**15. ขอบเขต (Range Statement)**

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

**Components or parts include:**

- Electrical looms, harnesses and cables associated with:
- Power distribution.
- Ignition.
- Control circuits.
- Signal circuits.

**Procedures and requirements include:**

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

**16. หน่วยสมรรถนะร่วม (ถ้ามี)**

N/A

**17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)**

N/A

**18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)**

• The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.
• Competency should be assessed in the work environment or simulated work environmentusing tools and equipment specified by aircraft in the maintenance manuals. It is alsoexpected that applicable general-purpose tools and test equipment found in most routinesituations would be used where appropriate.
• Evidence of knowledge about individual components and their links with systems will benecessary to supplement evidence of ability to interpret requirements and repaircomponents before undertaking any action. The work plan should take account ofapplicable safety and quality requirements in accordance with the industry and regulatory standards.
• A person cannot be assessed as competent until it can be demonstrated to the satisfactionof the workplace assessor that the relevant elements and performance criteria of the unit ofcompetency are being achieved under routine supervision on a representative range oftasks, including:
• Power distribution.
• Ignition.
• Control circuits.
• Signal circuits.
• This shall be established via the records in the Log of Industrial Experience and achievement or, where appropriate, an equivalent Industry Evidence Guide (for detailsrefer to the Companion Volume Assessment Guidelines).

**1. รหัสหน่วยสมรรถนะ** 101404

**2. ชื่อหน่วยสมรรถนะ** Inspect, test and troubleshoot aircraft hydro-mechanical and landing gear.

**3. ทบทวนครั้งที่** N/A

**4. สร้างใหม่** ☑ **ปรับปรุง** ☐

**5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)**

7232 Aircraft engine mechanics and fitters

**6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)**

This unit of competency applies hand skills, standard trade practices and systems knowledge to inspect, test and troubleshoot the aircraft hydro-mechanical and landing gear systems and components of fixed and rotary wing aircraft during scheduled or unscheduled maintenance. This work may be carried out individually or as part of a team.

**7. สำหรับระดับคุณวุฒิ**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

**8. กลุ่มอาชีพ (Sector)**

10 Aircraft Mechanics

**9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)**

102 Aircraft Mechanics: Helicopter

**10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)**

ICAO Doc 7192 / EASA Part 66

**11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)**

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 01404.02<br>Inspect landing gear systems and components. | 101404.02.01 Isolation tags already attached to the system or related systems are checked and aircraft configured, including jacking where necessary, for safe system inspection and operation according to specified procedures.<br>101404.02.02 Landing gear system and system components are visually or physically checked for external signs of defects according to specified procedures while noticing all relevant WHS requirements, including the use of MSDS and PPE. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101404.01<br>Inspect hydro-mechanical systems and components. | 101404.01.01 Isolation tags already attached to the system or related systems are checked and aircraft configured for safe system inspection and operation according to specified procedures.<br>101404.01.02 Hydro-mechanical system and system components are visually or physically checked for external signs of defects according to specified procedures while noticing all relevant work health and safety (WHS) requirements, including the use of material safety data sheets (MSDS) and items of personal protective equipment (PPE). | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |
| 101404.03<br>Test hydro-mechanical and landing gear systems. | 101404.03.01 The aircraft and hydro-mechanical systems are correctly prepared, according to specified procedures, for the application of power.<br>101404.03.02 Power is applied and system functionally tested, according to specified procedures, for indication of malfunction or leaks. System calibration or adjustments are carried out according to specified procedures. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |
| 101404.04<br>Troubleshoot hydro-mechanical and landing gear systems. | 101404.04.01 Relevant maintenance documentation and modification status, including system defect/ service difficulty reports where applicable, are interpreted to identify an unserviceability. Available information from maintenance documentation and inspection and test results is employed, where necessary, to assist in fault determination.<br>101404.04.02 Maintenance manual fault diagnosis guide and logical processes are employed to ensure efficient and accurate troubleshooting to line replacement level. Specialist advice is attained, where required, to assist with the troubleshooting process. Hydro-mechanical and landing gear system faults are located and the causes of the faults are clearly identified and correctly recorded in maintenance documentation, where required. Fault rectification requirements are determined to support in planning the repair or adjustment. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

**12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)**

101313 Remove and install aircraft hydro-mechanical system and landing gear components

**13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)**

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

**14. หลักฐานที่ต้องการ (Evidence Guide)**

**(a) Performance Evidence**

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria under the indicated conditions of assessment, and must include:

• Using hand skills and tools in the inspection, adjustment and troubleshooting of hydraulic, fuel and landing gear systems.
• Using hand skills and tools in the inspection, adjustment and troubleshooting of hydraulic and fuel system components.
• Jacking of the aircraft, as required, for landing gear system inspection, testing and troubleshooting.
• Using hand skills and tools in the inspection, adjustment and troubleshooting of landing gear components.
• Using maintenance manuals to prepare the aircraft for inspection, testing and troubleshooting of hydro-mechanical and landing gear systems and components.
• Effectively using maintenance documentation and relevant fault diagnosis guides in the troubleshooting process.
• Recognising external defects in hydro-mechanical and landing gear systems and Components.
• Applying standard procedures.
• Observing all relevant WHS practices, including the use of MSDS and PPE.

The fundamental skills inherent in this unit should be transferable across a range of inspection, testing and troubleshooting tasks (including the timely involvement of supervisors or other trades) associated with aircraft hydro-mechanical and landing gear systems and their components.

It is crucial that system test procedures consider all safety precautions relevant to the maintained system, especially where system operation/switching interrelates to other systems being maintained.

It is essential to be able to interpret inspection procedures and specifications (allowable limits) and apply them in practice. This shall be demonstrated through application across a range of airframe systems and components as specified in the Assessment Conditions.

**(b) Knowledge Evidence**

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria and include knowledge of:

• Standard trade practices relating to tool usage and installation/securing of aircraft hardware.
• Fluid power theory.
• Hydraulic system layout, operation and characteristics (including electrical system interfaces) and system component construction and operation for:
• Flight control systems including primary controls, flaps, speed brakes and spoilers.
• Landing gear retraction systems.
• Brake and anti-skid systems.
• Nosewheel steering systems.
• Fuel system and component layout, operation and characteristics (including electrical system interfaces) and system component operation and construction.
• Construction and operation of landing gear components, including:
• Wheel assemblies.
• Skids.
• Floats.
• Struts/oleos.
• Uplocks and downlocks.
• Mechanical linkages.
• How to configure the aircraft for inspection, testing and troubleshooting of hydraulic, fuel and landing gear systems and components.
• Maintenance requirements and troubleshooting procedures.
• Relevant WHS practices relating to hydraulic systems, fuel systems and landing gear components, including lifting and handling of heavy items.
• How to obtain MSDS.
• Selection and use of PPE.
• Relevant maintenance manuals.
• Relevant regulatory requirements and standard procedures.

**(c) Assessment recommendation**

N/A

**15. ขอบเขต (Range Statement)**

**(a) Recommendation**

Different working environments and conditions that may affect performance are admissible in this field. Crucial operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

**(b) Description**

Hydro-mechanical systems include:

- Hydraulic systems.
- Fuel systems.

Components of hydro-mechanical systems include:

- Hydraulic accumulators, filters, reservoirs, valves, pumps, motors, actuators, regulators and direct reading gauges.
- Fuel system filters, valves, pumps, rigid and flexible storage cells/tanks.
- Rigid and flexible pipelines, hoses and fittings.

Landing gear systems include:

- Retraction systems.
- Steering systems.
- Brake systems, including anti-skid, where applicable.

Landing gear components include:

(Components of landing gear systems are included in hydro-mechanical system components).

- Wheel assemblies, skids and floats.
- Brake units.
- Struts/oleos.

Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

Electrical interface includes:

- Associated electrical loom terminations and/or plugs.

**16. หน่วยสมรรถนะร่วม (ถ้ามี)**

N/A

**17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)**

N/A

**18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)**

• The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.
• Competency should be assessed in the work environment or simulated work environment, using procedures, tools and equipment stated in maintenance documentation. It is also expected that applicable general-purpose tools, test and ground support equipment found in most routine situations would be used where appropriate.
• Before undertaking any action, the application of testing procedures should clearly indicate knowledge of system operation, the relationship of individual components and the links with other systems (if applicable) within the limits of the aircraft/system fault-finding guide.The work plan should consider applicable safety (including safe handling of heavy components) and quality requirements according to the industry and regulatory standards.
• The level of troubleshooting is restrictedto its application to the use of fault diagnosis guides or other similar information.
• A person cannot be assessed as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of this unit of competency are being achieved under routine supervision on each type of system:
• Hydraulic systems.
• Fuel systems.
• Retraction systems.
• Steering systems.
• Brake systems, including anti-skid, where applicable and on at least one (1) component from each of the following groups:
• Hydraulic accumulators, filters, reservoirs, valves, pumps, motors, actuators,regulators, direct reading gauges.
• Fuel system filters, valves, pumps, rigid and flexible storage cells/tanks rigid and flexible pipelines, hoses and fittings.
• Wheel assemblies, skids and floats.
• Brake units.
• Struts/oleos.

Where the aircraft is rotary wing and is fitted with skids or floats, coverage of retractionsystems, steering systems and brake systems and their components is not required. Wherea rotary wing aircraft is fitted with a fixed undercarriage with wheels, coverage ofretraction and steering systems and their components is not required.

This shall be proven via the records in the Log of Industrial Experience andAchievement or, where appropriate, an equivalent Industry Evidence Guide.

**1. รหัสหน่วยสมรรถนะ** 101405

**2. ชื่อหน่วยสมรรถนะ** Inspect, test and troubleshoot aircraft pneumatic systems and components.

**3. ทบทวนครั้งที่** N/A

**4. สร้างใหม่** ☑ **ปรับปรุง** ☐

**5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)**

7232 Aircraft engine mechanics and fitters

**6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)**

This unit of competency employs hand skills, standard trade practices and systems knowledge to inspect, test and troubleshoot both fixed and rotary wing aircraft pneumatic systems and components during scheduled or unscheduled maintenance. This work may be carried out individually or as part of a team.

**7. สำหรับระดับคุณวุฒิ**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

**8. กลุ่มอาชีพ (Sector)**

10 Aircraft Mechanics

**9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)**

102 Aircraft Mechanics: Helicopter

**10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)**

ICAO Doc 7192 / EASA Part 66

**11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)**

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101405.01<br>Inspect and test pneumatic systems and components. | 101405.01.01 Isolation tags already attached to the system or related systems are checked and aircraft configured for safe system inspection and operation according to specified procedures. Pneumatic system is visually or physically checked for external signs of defects according to specified procedures while noticing all relevant work health and safety (WHS) requirements.<br>101405.01.02 The aircraft and pneumatic systems are correctly prepared according to indicated procedures for the application of power. Power is applied and system functionally tested according to specified procedures for indication of malfunction or leaks. System calibration or adjustments are carried out according to specified procedures. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101405.02<br>Troubleshoot pneumatic systems. | 101405.02.01 Relevant maintenance documentation and modification status, including system defect/service difficulty reports, where applicable, are interpreted to identify an unserviceability. Available information from maintenance documentation and inspection and test results is employed, where necessary, to assist in fault determination.<br>101405.02.02 Maintenance manual fault diagnosis guide and logical processes are employed to ensure efficient and accurate troubleshooting to line replacement level. Specialist advice is attained, where required, to assist with the troubleshooting process. Pneumatic system faults are located and the causes of the faults are clearly identified and correctly recorded in maintenance documentation, where required. Fault rectification requirements are determined to assist in planning the repair or adjustment. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

**12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)**

101314 Remove and install aircraft pneumatic system components

**13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)**

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

**14. หลักฐานที่ต้องการ (Evidence Guide)**

**(a) Performance Evidence**

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria under the indicated conditions of assessment, and must include:

• Using hand skills and tools in the inspection, adjustment and troubleshooting of pneumatic systems.
• Using hand skills and tools in the inspection, adjustment and troubleshooting of pneumatic system components.
• Using maintenance manuals to prepare the aircraft for inspection, testing and troubleshooting of pneumatic systems and components.
• Effectively using maintenance documentation and relevant fault diagnosis guides in the troubleshooting process.
• Recognising external defects in pneumatic systems and components.
• Applying standard procedures.
• Observing all relevant WHS practices.

The fundamental skills inherent in this unit should be transferable across a range of inspection, testing and troubleshooting tasks (including the timely involvement of supervisors or other trades) associated with aircraft pneumatic systems and their components. It is essential that system testing procedures consider all safety precautions associated with piston engine system operation, and that awareness be demonstrated of dual inspection requirements associated with the system being maintained, especially where system operation/switching interrelates to other systems being maintained.

It is essential to be able to interpret inspection procedures and specifications (allowable limits) and apply them in practice. This shall be demonstrated through application across a range of systems as specified in the Assessment Conditions.

**(b) Knowledge Evidence**

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

• Standard trade practices relating to tool usage and installation/securing of aircraft hardware.
• Pneumatic system:
• Layout.
• Operation and characteristics.
• Component operation and construction.
• Electrical and instrument system interfaces.
• How to configure the aircraft for inspection, testing and troubleshooting of pneumatic systems and components.
• Pneumatic system maintenance requirements and troubleshooting procedures.
• WHS procedures relating to pneumatic systems and components.
• Relevant maintenance manuals.
• Relevant regulatory requirements and standard procedures, including those relating to the handling and control of halon fire-extinguishers.

**(c) Assessment recommendation**

N/A

**15. ขอบเขต (Range Statement)**

**(a) Recommendation**

Different working environments and conditions that may affect performance are admissible in this field. Crucial operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

**(b) Description**

Pneumatic systems include:

• De-icing.
• Air cycle air conditioning.
• Pressurisation.
• Fire-extinguishing.

Components of pneumatic systems include:

- Filters, valves, pumps, motors, actuators and regulators.
- Gauges (direct reading), temperature sensors, pressurisation controllers and temperature controllers.
- Heat exchangers, pressure vessels, condensers, compressors, expansion turbines and humidifiers.
- Rigid and flexible pipelines, hoses and fittings.
- Ducting.

Electrical interface includes:

- Associated electrical loom terminations and/or plugs.

Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

**16. หน่วยสมรรถนะร่วม (ถ้ามี)**

N/A

**17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)**

N/A

**18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)**

- The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.
- Competency should be assessed in the work environment or simulated work environment, using procedures, tools and equipment stated in maintenance documentation. It is also expected that applicable general-purpose tools, test and ground support equipment found in most routine situations would be used where appropriate.
- The level of troubleshooting is restrictedto its application to the use of fault diagnosis guides or other similar information.
- Before undertaking any action, the application of testing procedures should clearly indicate knowledge of system operation, the relationship of individual components and the links with other systems (if applicable) within the limits of the aircraft/system fault-finding guide. The work plan should consider applicable safety and quality requirements according to the industry and regulatory standards.
- A person cannot be assessed as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of this unit of competency are being achieved under routine supervision on each type of system:
- De-icing.
- Air cycle air conditioning.
- Pressurisation.
- Fire-extinguishingand on at least one (1) component from each of the following groups:
- Fi00lters, valves, pumps, motors, actuators and regulators.
- Gauges (direct reading), temperature sensors, pressurisation controllers and temperature controllers.
- Heat exchangers, pressure vessels, condensers, compressors, expansion turbines and humidifiers.
- Rigid and flexible pipelines, hoses and fittingsducting.

This shall be proven via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.

**1. รหัสหน่วยสมรรถนะ** 101407

**2. ชื่อหน่วยสมรรถนะ** Inspect, test and troubleshoot piston engine systems and components.

**3. ทบทวนครั้งที่** N/A

**4. สร้างใหม่** ☑ **ปรับปรุง** ☐

**5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)**

7232 Aircraft engine mechanics and fitters

**6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)**

This unit of competency employs hand skills, maintenance publications, and knowledge of piston engine and system theory in the inspection, testing and troubleshooting fixed and rotary wing aircraft piston engines and engine system components during scheduled or unscheduled maintenance. This work may be carried out individually or as part of a team.

**7. สำหรับระดับคุณวุฒิ**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

**8. กลุ่มอาชีพ (Sector)**

10 Aircraft Mechanics

**9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)**

102 Aircraft Mechanics: Helicopter

**10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)**

ICAO Doc 7192 / EASA Part 66

**11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)**

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101407.01<br>Inspect and test piston engine system and components. | 101407.01.01 Isolation tags already attached to the system or related systems are checked and aircraft/engine configured for safe system inspection and operation according to applicable maintenance manual. Piston engine and/or components are visually or physically checked for external and internal signs of defects according to applicable maintenance manual while noticing all relevant work health and safety (WHS) requirements, including the use of material safety data sheets (MSDS) and items of personal protective equipment (PPE).<br>101407.01.02 Aircraft and engine system are correctly prepared according to applicable maintenance manual and connected to appropriate test equipment. Built-in system test functions and status displays are activated, where relevant, outputs recorded and interpreted. Assistance is provided with engine and/or system operation during prescribed test procedures to set up serviceability and correct function according to applicable maintenance manual. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |
| 101407.02<br>Troubleshoot piston engine system. | 101407.02.01 Relevant maintenance documentation and modification status, including system defect reports, where relevant, are employed to identify an unserviceability. Available information from maintenance documentation and inspection and test results is employed, where necessary, to assist in fault determination.<br>101407.02.02 Maintenance manual fault diagnosis guide and logical processes are employed to ensure efficient and accurate troubleshooting to line replacement level. Specialist advice is acquired, where required, to assist with the troubleshooting process. Piston engine system faults are located and the causes of the faults are clearly identified and correctly recorded in maintenance documentation, where required. Fault rectification requirements are determined to support in planning the repair. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

**12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)**

101317 Remove and install engine systems and components

**13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)**

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

**14. หลักฐานที่ต้องการ (Evidence Guide)**

**(a) Performance Evidence**

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria under the indicated conditions of assessment, and must include:

• Applying relevant WHS procedures, including the use of MSDS and PPE.
• Using relevant maintenance documentation and aircraft manuals.
• Through visual/physical inspection, recognising external and internal signs of defects in piston engines, components and system components.
• Assisting with testing of piston engine and engine system operation, be able to operate systems, monitor indications, record parameters and recognise correct function.
• Compiling engine condition monitoring records.
• Rigging and adjusting engine controls and systems, including FADEC (where FADEC is applicable to the enterprise).
• Using fault diagnosis guides and equivalent data to accurately and efficiently troubleshoot the causes of unserviceability in piston engines and engine systems, clearly record details and identify the required rectification actions.

The fundamental skills inherent in this unit should be transferable across a range of inspection, testing and troubleshooting tasks (including the timely involvement of supervisors or other trades) associated with engine systems. It is crucial that system testing procedures consider all safety precautions associated with piston engine system operation, and that awareness be demonstrated of dual inspection requirements associated with work on engine controls.

It is essential to be able to interpret inspection procedures and specifications (allowable limits) and apply them in practice. This shall be demonstrated through application across a number of engine system groups as specified in the Assessment Conditions. Knowledge of system operation including testing procedures and functional rigging checks should also be indicated.

**(b) Knowledge Evidence**

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

• WHS procedures associated with piston engine maintenance, including lifting and handling of heavy objects.
• How to obtain MSDS.
• Use of PPE.
• Fault diagnosis techniques.
• Piston engine and engine system layout and operation:
• Four stroke engine theory of operation and performance.
• Cylinder configurations.
• Construction – components and materials.
• Carburetors and air induction systems.
• Fuel injection systems.
• Fuels and their characteristics.
• Ignition systems.
• Lubricating systems and lubricants.
• Cooling systems.
• Exhaust systems.
• Superchargers and turbochargers.
• Accessory drives and mounts.
• Controls and rigging of controls.
• FADEC systems.
• Piston engine maintenance requirements and troubleshooting procedures including ground running of engines.
• System component operation, including electrical and instrument system interfaces:
• Magnetos and ignition harnesses.
• Spark plugs.
• Fuel pumps.
• Fuel filters.
• Oil pumps.
• Oil filters.
• Oil tanks.
• Vacuum pumps and air pumps.
• Generators.
• Starter motors.
• Oil pressure gauges (direct reading).
• Temperature gauges (direct reading).
• Tachometers.
• Manifold pressure gauges.
• System and component maintenance requirements and troubleshooting procedures.
• Relevant maintenance manuals.
• Relevant regulatory requirements and standard procedures.

**(c) Assessment recommendation**

N/A

## 15. ขอบเขต (Range Statement)

### (a) Recommendation

Different working environments and conditions that may affect performance are admissible in this field. Crucial operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

### (b) Description

Piston engines and engine systems include:

• Engine (all types), main components and accessories/drives.
• Control system, including full authority digital engine control (FADEC) (where FADEC is applicable to the enterprise).
• Ignition and starter systems.
• Fuel, air systems and super/turbo chargers.

• Oil system.

Procedures and requirements include:

• Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

**16. หน่วยสมรรถนะร่วม (ถ้ามี)**

N/A

**17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)**

N/A

**18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)**

• The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.

• Competency should be assessed in the work environment or simulated work environment using tools and equipment stated in aircraft maintenance manuals. It is also expected that applicable general-purpose tools, test and ground support equipment found in most routine situations would be used where appropriate.

• Before undertaking any action, engine system operation knowledge, the relationship of individual components and the links with other systems will be necessary to supplement evidence of ability to carry out rigging checks and troubleshoot the system within the limits of the aircraft/system fault-finding guide. The work plan should consider applicable safety and quality requirements according to the industry and regulatory standards.

• Testing of engines fitted to helicopters (where auxiliary drive is not available) may be performed through the applicant directing a pilot qualified on type.

• A person cannot be assessed as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of the unit of competency are being achieved under routine supervision on at least one (1) item from each of the following groups:Engine (all types), main components and accessories/drives.

• Control system, including FADEC (where FADEC is applicable to the enterprise).

• Ignition and starter systems.

• Fuel, air systems and super/turbo chargers.

• Oil system.

• This shall be proven via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide (for details refer to the Companion Volume Assessment Guidelines).

• Individuals being assessed who have already attained 101319 Maintain basic light aircraft engines and propellers will have satisfied the requirements of this unit with regard to common Range of Conditions variables. The Log of Industrial Experience and Achievement records relating to 101319 Maintain basic light aircraft engines and propellers may be accepted as also meeting the evidence requirements for this unit in the applicable common areas.

**1. รหัสหน่วยสมรรถนะ** 101409

**2. ชื่อหน่วยสมรรถนะ** Inspect aircraft hydro-mechanical, mechanical, gaseous and landing gear.

**3. ทบทวนครั้งที่** N/A

**4. สร้างใหม่** ☑ **ปรับปรุง** ☐

**5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)**

7232 Aircraft engine mechanics and fitters

**6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)**

This unit of competency employs hand skills, standard trade practices and systems knowledge to inspect aircraft hydro-mechanical, mechanical, gaseous and landing gear systems and components of fixed wing aircraft during scheduled or unscheduled maintenance. This work may be carried out individually or as part of a team.

**7. สำหรับระดับคุณวุฒิ**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

**8. กลุ่มอาชีพ (Sector)**

10 Aircraft Mechanics

**9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)**

102 Aircraft Mechanics: Helicopter

**10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)**

ICAO Doc 7192 / EASA Part 66

**11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)**

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101409.01<br>Inspect hydro-mechanical systems and components. | 101409.01.01 Isolation tags already attached to the system or related systems are checked and aircraft configured for safe system inspection and operation according to specified procedures.<br>101409.01.02 Hydro-mechanical system and system components are visually or physically checked for external signs of defects according to specified procedures while noticing all relevant work health and safety (WHS) requirements, including the use of material safety data sheets (MSDS) and items of personal protective equipment (PPE). | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>ข้อสอบข้อเขียน |

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101409.02<br>Inspect gaseous systems and components. | 101409.02.01 Isolation tags already attached to the system or related systems are checked and aircraft configured, including jacking, where necessary, for safe system inspection and operation according to specified procedures.<br>101409.02.02 Landing gear system and system components are visually or physically checked for external signs of defects according to specified procedures while noticing all relevant WHS requirements, including the use of MSDS and items of PPE. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |
| 101409.03<br>Inspect mechanical and landing gear systems and components. | 101409.03.01 Isolation tags already attached to the system or related systems are checked and aircraft configured for safe system inspection and operation according to specified procedures.<br>101409.03.02 Gaseous system and system components are visually or physically checked for external signs of defects according to specified procedures while noticing all relevant WHS requirements. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |
| 101409.04<br>Inspect mechanical systems and components. | 101409.04.01 Isolation tags already attached to the system or relevant systems are checked and aircraft configured for safe system inspection and operation according to specified procedures.<br>101409.04.02 Mechanical system and system components are visually or physically checked for external signs of defects according to specified procedures while noticing all relevant WHS requirements. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

**12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)**

101313 Remove and install aircraft hydro-mechanical system and landinggear components
101314 Remove and install aircraft pneumatic system components
101316 Remove and install aircraft fixed wing flight control system components

**13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)**

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

**14. หลักฐานที่ต้องการ (Evidence Guide)**

**(a) Performance Evidence**

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria under the indicated conditions of assessment, and must include:

• Applying all relevant WHS practices, including the use of MSDS and PPE.

• Using maintenance manuals and documentation to prepare the aircraft and identify requirements for inspection of hydraulic, fuel, gaseous, flight control, landing gear and mechanical systems and components.

• Using hand skills and tools in the inspection of hydraulic, fuel, flight control, gaseous and mechanical system components.

• Jacking of the aircraft, as required, for landing gear system inspection.

• Using hand skills and tools in the inspection of landing gear components.

• Recognising external defects in hydraulic, fuel, gaseous, flight control, landing gear and mechanical systems and components.

The fundamental skills inherent in this unit should be transferable across a range of inspection, testing and troubleshooting tasks (including the timely involvement of supervisors or other trades) associated with aircraft hydro-mechanical, gaseous, mechanical and landing gear systems and their components. It is crucial that system/component inspection procedures consider all safety precautions applicable to the system being maintained, especially where system operation/switching interrelates to other systems being maintained.

It is essential to be able to interpret inspection procedures and specifications (allowable limits) and apply them in practice. This shall be demonstrated through application across a range of systems as specified in the Assessment Conditions.

**(b) Knowledge Evidence**

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria and include knowledge of:

• How to recognise external defects in hydraulic, fuel, gaseous, flight control, landing gear and mechanical system components.

• How to configure the aircraft for inspection of hydraulic, fuel, gaseous, flight control, landing gear and mechanical systems and components.

• Inspection and testing requirements for gears, springs and bearings.

• Standard trade practices relating to tool usage and installation/securing of aircraft hardware.

• Maintenance requirements.

• Relevant WHS practices relating to hydraulic, fuel, gaseous, flight control, landing gear and mechanical system components, including lifting and handling of heavy items.

• How to obtain MSDS.

• Selection and use of PPE.

• Maintenance requirements.

• Relevant maintenance manuals.

**(c) Assessment recommendation**

N/A

**15. ขอบเขต (Range Statement)**

**(a) Recommendation**

Different working environments and conditions that may affect performance are admissible in this field. Crucial operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

**(b) Description**

Hydro-mechanical systems include:

• Hydraulic systems.

• Fuel systems.

Components of hydro-mechanical systems include:

• Hydraulic accumulators, filters, reservoirs, valves, pumps, motors, actuators regulators and direct reading gauges.

• Fuel system filters, valves, pumps, and rigid and flexible storage cells/tanks.

• Rigid and flexible pipelines, hoses and fittings.

Landing gear systems include:

(components of landing gear retraction, steering and braking systems are covered by hydro-mechanical and mechanical system components)

- Retraction systems.
- Steering systems.
- Brake systems, including anti-skid, where applicable.

Landing gear components include:

- Wheel assemblies.
- Brake units.
- Struts/oleos.

Gaseous systems include:

- Pneumatic.
- Air cycle air conditioning.
- Pressurisation.
- Fire-extinguishing.

Gaseous system components include:

- Gauges (direct reading), temperature sensors, pressurisation controllers and temperature controllers.
- Heat exchangers, pressure vessels, condensers, compressors, expansion turbines, humidifiers, valves and actuators.
- Rigid and flexible pipelines and fittings.
- Ducting

Mechanical systems include:

- Mechanical operating and locking systems.
- Mechanical flight control systems or the mechanical elements of power-assisted flight control systems.

Mechanical system components include:

- Cables, pulleys, guides, fairleads, tension regulators, chains and sprockets.
- Control rods, torque tubes, bellcranks, screwjacks, clutches, springs, bearings and gears.
- Control sticks, wheels, columns, trim wheels or handles, and rudder pedals.

Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

**16. หน่วยสมรรถนะร่วม (ถ้ามี)**

N/A

**17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)**

N/A

**18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)**

• The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.
• Competency should be assessed in the work environment or simulated work environment, using procedures, tools and equipment stated in maintenance documentation. It is also expected that applicable general-purpose tools, test and ground support equipment found in most routine situations would be used where appropriate.
• The work plan should consider applicable safety and quality requirements according to the industry and regulatory standards.
• A person cannot be assessed as competent until it can be demonstrated to the satisfactionof the workplace assessor that the relevant elements and performance criteria of this unitof competency are being achieved under routine supervision on each type of system andon at least one (1) component of each group listed in the Range of Conditions, as follows:
• Hydraulic systems – a system and at least one (1) component from each of thefollowing groups:
• Hydraulic accumulators, filters, reservoirs, valves, pumps, motors, actuators,regulators and direct reading gauges.
• Rigid and flexible pipelines, hoses and fittings.
• Fuel systems – a system and at least one (1) component from each of the followinggroups:
• Fuel system filters, valves, pumps, and rigid and flexible storage cells/tanks.
• Rigid and flexible pipelines, hoses and fittings.
• Landing gear systems – each system:
• Retraction systems.
• Steering systems.
• Brake systems, including anti-skid, where applicable.
• Landing gear components – one (1) each of:
• Wheel assemblies.
• Brake units.
• Struts/oleos.
• Gaseous systems – each listed system:
• Pneumatic.
• Air cycle air conditioning.
• Pressurisation.
• Fire-extinguishing.
• Gaseous system components - at least one (1) component from each of the followinggroups:
• Gauges (direct reading), temperature sensors, pressurisation controllers andtemperature controllers.
• Heat exchangers, pressure vessels, condensers, compressors, expansion turbines.
• Humidifiers, valves and actuators.
• Rigid and flexible pipelines and fittings.
• Ducting.
• Mechanical systems – a system applicable to each of system types:
• Mechanical operating and locking systems.
• Mechanical flight control systems or the mechanical elements of power-assistedflight control systems.
• Mechanical system components - at least one (1) component from each of thefollowing groups:
• Cables, pulleys, guides, fairleads, tension regulators, chains and sprockets.
• Control rods, torque tubes, bellcranks, screwjacks, clutches, springs, bearings andgears.
• Control sticks, wheels, columns, trim wheels or handles, and rudder pedals.

This shall be proven via the records in the Log of Industrial Experience and achievement or, where appropriate, an equivalent Industry Evidence Guide.

• Individuals being assessed who have already attained the following related units will havemet the Performance Criteria and Range of Conditions variables for Elements listed:
• 101404 Inspect, test and troubleshoot aircraft hydro-mechanical and landing gearsystems and components, for Element 1.
• 101404 Inspect, test and troubleshoot aircraft hydro-mechanical and landing gearsystems and components, for Element 2, provided that the unit was attained on aircraftwith retractable landing gear.
• 101405 Inspect, test and troubleshoot aircraft pneumatic systems and components,for Element 3.
• 101406 Inspect, test and troubleshoot aircraft fixed wing flight control systems andcomponents, for Element 4.

The Log of Industrial Experience and Achievement records relating to the listed units maybe accepted as also meeting the evidence requirements for this unit in the applicableElements.

**1. รหัสหน่วยสมรรถนะ** 101410

**2. ชื่อหน่วยสมรรถนะ** Inspect gas turbine engine systems and components.

**3. ทบทวนครั้งที่** N/A

**4. สร้างใหม่** ☑ **ปรับปรุง** ☐

**5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)**

7232 Aircraft engine mechanics and fitters

**6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)**

This unit of competency employs hand skills, maintenance publications, and knowledge of gas turbine engine and system theory in the inspection of gas turbine engines and engine system components of fixed and rotary wing aircraft. This work may be carried out individually or as part of a team.

**7. สำหรับระดับคุณวุฒิ**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

**8. กลุ่มอาชีพ (Sector)**

10 Aircraft Mechanics

**9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)**

102 Aircraft Mechanics: Helicopter

**10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)**

ICAO Doc 7192 / EASA Part 66

**11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)**

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101410.01<br>Inspect gas turbine engine systems and components. | 101410.01.01 Isolation tags already attached to the system or relevant systems are checked and aircraft configured for safe system inspection and operation according to applicable maintenance manual.<br>101410.01.02Gas Turbine engine systems are visually or physically checked for external signs of defects according to the applicable maintenance manual while noticing all relevant work health and safety (WHS) requirements, including the use of material safety data sheets (MSDS) and items of personal protective equipment (PPE). | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101410.02<br>Inspect gas turbine engine components. | 101410.02.01 Isolation tags already attached to the system or relevant systems are checked and aircraft configured for safe system inspection and operation according to applicable maintenance manual.<br>101410.02.02 Gas turbine engine components are visually or physically checked for external signs of defects according to the applicable maintenance manual while noticing all relevant work health and safety (WHS) requirements, including the use of material safety data sheets (MSDS) and items of personal protective equipment (PPE). | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

**12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)**

101317 Remove and install engine system and components

**13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)**

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

**14. หลักฐานที่ต้องการ (Evidence Guide)**

**(a) Performance Evidence**

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria under the indicated conditions of assessment, and must include:

• Applying relevant WHS procedures, including lifting and handling of heavy components.
• Using MSDS and PPE.
• Using relevant maintenance documentation and aircraft manuals to:
• Recognise through visual/physical inspection external and internal signs of defects/damage to gas turbine engine, components and system componentsassist with testing of gas turbine engine and engine system operation.

The fundamental skills inherent in this unit should be transferable across a range of inspection, testing and troubleshooting tasks (including the timely involvement of supervisors or other trades) associated with gas turbine engines, components and systems. It is crucial that inspection procedures consider all safety precautions applicable to the system/component being maintained.

It is essential to be able to interpret inspection procedures and specifications (allowable limits) and apply them in practice. This shall be demonstrated through application across a range of systems as specified in the Assessment Conditions.

**(b) Knowledge Evidence**

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria and include knowledge of :

• Gas turbine engine layout and operation:
• Intakes.
• Compressors.
• Combustion chambers.
• Turbines.
• Exhaust.
• Thrust reversers.
• Accessory drives.
• Bearings and seals.
• Maintenance requirements.
• System and component operation, including electrical and instrument system interfaces:
• Fuel control and fuels.
• Lubrication and lubricants.
• Air distribution.
• Starting.
• Ignition.
• Power augmentation.
• Instrumentation:
• Performance indication.
• Condition indication.
• Warning.
• Presentation and interpretation of electronic displays.
• Fire warning and extinguishing.
• control system.
• Engine spin/run procedures, including the operation of auxiliary power units (APUs).
• Engine condition monitoring.
• Relevant WHS practices, including the requirements for the lifting and handling of heavy components.
• How to obtain MSDS.
• Selection and use of PPE.
• Maintenance requirements.
• Relevant maintenance manuals.
• Relevant regulatory requirements and standard procedures.

**(c) Assessment recommendation**

N/A

**15. ขอบเขต (Range Statement)**

**a) Recommendation**

Different working environments and conditions that may affect performance are admissible in this field. Crucial operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

**(b) Description**

Gas turbine engine and components include:

• Engine change unit, main components and accessories/drives.

• Control system and major system components.

• Ignition and starter systems and major system components.

• Engine fuel system and major system components.

• Oil system and major system components.

• N/AAir system and major system components.

Procedures and requirements include:

• Industry standard procedures specified by manufacturers,regulatory authorities or the enterprise.

**16. หน่วยสมรรถนะร่วม (ถ้ามี)**

N/A

**17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)**

N/A

**18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)**

• The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.

• Competency should be assessed in the work environment or simulated work environment using tools and equipment stated in maintenance manuals. It is also expected that applicable general-purpose tools, test and ground support equipment found in most routine situations and used to assist in the inspection process would be used where appropriate.

• The work plan should consider applicable safety and quality requirements according to the industry and regulatory standards.

• A person cannot be assessed as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of the unit of competency are being achieved under routine supervision on each of the following systems and at least one (1) component of each system.

• Engine change unit, main components and accessories/drives.

• Control system and major system components.

• Ignition and starter systems and major system components.

• Engine fuel system and major system components.

• Oil system and major system components.

• Air system and major system components.

This shall be proven via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.

**1. รหัสหน่วยสมรรถนะ** 101411

**2. ชื่อหน่วยสมรรถนะ** Test and troubleshoot aircraft hydro-mechanical, gaseous and landing gear.

**3. ทบทวนครั้งที่** N/A

**4. สร้างใหม่** ☑ **ปรับปรุง** ☐

**5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)**

7232 Aircraft engine mechanics and fitters

**6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)**

This unit of competency employs hand skills, standard trade practices, and systems knowledge to test and troubleshoot the aircraft hydro-mechanical, mechanical, gaseous and landing gear systems and components of fixed wing aircraft during the scheduled or unscheduled maintenance. This work may be carried out individually or as part of a team.

**7. สำหรับระดับคุณวุฒิ**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

**8. กลุ่มอาชีพ (Sector)**

10 Aircraft Mechanics

**9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)**

102 Aircraft Mechanics: Helicopter

**10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)**

ICAO Doc 7192 / EASA Part 66

**11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)**

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101411.01<br>Test hydro-mechanical, mechanical, gaseous and landing gear systems and components. | 101411.01.01 The aircraft and hydro-mechanical, mechanical, gaseous and landing gear systems are correctly prepared according to specified procedures for the application of power.<br>101411.01.02 Power is applied and system and components functionally tested according to specified procedures for indication of malfunction or leaks while applying all relevant work health and safety (WHS) procedures. System calibration or adjustments are carried out according to specified procedures. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101411.02<br>Troubleshoot hydro-mechanical, mechanical, gaseous and landing gear systems and components. | 101411.02.01 Relevant maintenance documentation and modification status, including system defect/service difficulty reports, where appropriate, are interpreted to identify an unserviceability. Available information from maintenance documentation and inspection and test results is employed, where necessary, to assist in fault determination.<br>101411.02.02 Maintenance manual fault diagnosis guide and logical processes are employed to ensure efficient and accurate troubleshooting to line replacement level. Specialist advice is acquired, where required, to assist with the troubleshooting process. Hydro-mechanical, mechanical, gaseous and landing gear system and component faults are located and the causes of the faults are clearly identified and correctly recorded in maintenance documentation, where required. Fault rectification requirements are determined to support in planning the repair or adjustment. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

**12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)**

101409 Inspect aircraft hydro-mechanical, mechanical, gaseous and landing gear systems and components

**13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)**

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

**14. หลักฐานที่ต้องการ (Evidence Guide)**

**(a) Performance Evidence**

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria under the indicated conditions of assessment, and must include:

- Applying all relevant WHS procedures.
- Using maintenance manuals to prepare the aircraft for testing and troubleshooting of hydraulic, fuel, gaseous, landing gear and mechanical systems and components.
- Using hand skills, tools and systems knowledge in the testing, adjustment and troubleshooting of hydraulic, fuel, gaseous, mechanical and landing gear systems.
- Using hand skills, tools and component knowledge in the adjustment and troubleshooting of hydraulic, fuel, gaseous and mechanical system components.
- Jacking of the aircraft, as required, for landing gear system testing, rigging and troubleshooting.
- Using hand skills, tools and system/component knowledge in the adjustment and troubleshooting of landing gear components.
- Effectively using maintenance documentation and relevant fault diagnosis guides in the troubleshooting process.
- Recognising external defects in hydro-mechanical, gaseous, mechanical and landing gear systems and components.

The fundamental skills inherent in this unit should be transferable across a range of inspection, testing and troubleshooting tasks (including the timely involvement of supervisors or other trades) associated with aircraft hydro-mechanical, gaseous, mechanical and landing gear systems and their components. It is crucial that system test procedures consider all safety precautions applicable to the system being maintained, especially where system operation/switching interrelates to other systems being maintained.

It is essential to be able to interpret inspection procedures and specifications (allowable limits) and apply them in practice. This shall be demonstrated through application across a range of systems as specified in the Assessment Conditions.

**(b) Knowledge Evidence**

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria and include knowledge of:

- Hydraulic, fuel, gaseous, mechanical and landing gear system layout, operation and characteristics and system component operation and construction, including electrical system interfaces.
- How to configure the aircraft for testing and troubleshooting of hydraulic, fuel, gaseous, mechanical and landing gear systems and components.
- Standard trade practices relating to tool usage and installation/securing of aircraft hardware.
- Fluid power theory.
- Hydraulic system layout, operation and characteristics (including electrical and instrument system interfaces) and system component construction and operation for:
- Landing gear retraction systems.
- Brake and anti-skid systems.
- Nose wheel steering systems.
- Fuel system and component layout, operation and characteristics (including electrical system interfaces) and system component operation and construction.
- Gaseous (pneumatic, air conditioning, pressurisation and fire-extinguishing system and component layout, operation and characteristics (including electrical and instrument interfaces) and system component operation and construction.
- Construction and operation of landing gear components, including:
- Wheel assemblies.
- Struts/oleos.
- Uplocks and downlocks.
- Mechanical systems and linkages, including those related to the above systems.
- How to configure the aircraft for inspection, testing and troubleshooting of hydraulic, fuel, gaseous and landing gear systems and components.
- Maintenance requirements and troubleshooting procedures.
- Relevant WHS practices relating to hydraulic, fuel, gaseous, mechanical and landing gear systems and components, including lifting and handling of heavy items.
- Relevant maintenance manuals.
- Relevant regulatory requirements and standard procedures.

**(c) Assessment recommendation**

N/A

**15. ขอบเขต (Range Statement)**

**(a) Recommendation**

Different working environments and conditions that may affect performance are admissible in this field. Crucial operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

**(b) Description**

Hydro-mechanical systems include:

- Hydraulic systems.
- Fuel systems.

Components of hydro-mechanical systems include:

- Hydraulic accumulators, filters, reservoirs, valves, pumps, motors, actuators, regulators and direct reading gauges.
- Fuel system filters, valves, pumps, rigid and flexible storage cells/tanks.
- Rigid and flexible pipelines, hoses and fittings.

Landing gear systems include:

(components of landing gear retraction, steering and braking systems are covered by hydro-mechanical and mechanical system components).

- Retraction systems.
- Steering systems.
- Brake systems, including anti-skid, where applicable.

Landing gear components include:

- Wheel assemblies.
- Brake units.
- Struts/oleos.

Gaseous systems include:

- Pneumatic.
- Air cycle air conditioning.
- Pressurisation.
- Fire-extinguishing.

Gaseous system components include:

- Gauges (direct reading), temperature sensors, pressurisation controllers and temperature controllers.
- Heat exchangers, pressure vessels, condensers, compressors, expansion turbines, humidifiers, valves and actuators.
- Rigid and flexible pipelines and fittings.
- Ducting.

Mechanical systems include:

- Mechanical operating and locking systems.

Mechanical system components include:

- Cables, pulleys, guides, fairleads, tension regulators, chains and sprockets.
- Push/pull rods, torque tubes, bellcranks, screwjacks, clutches, springs, bearings and gears .

Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

**16. หน่วยสมรรถนะร่วม (ถ้ามี)**

N/A

**17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)**

N/A

**18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)**

- The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.
- Competency should be assessed in the work environment or simulated work environment, using procedures, tools and equipment stated in maintenance documentation. It is also expected that applicable general-purpose tools, test and ground support equipment found in most routine situations would be used where appropriate.
- Before undertaking any action, the application of testing procedures should clearly indicate knowledge of system operation, the relationship of individual components and the links with other systems (if applicable) within the limits of the aircraft/system fault-finding guide. The work plan should consider applicable safety and quality requirements according to the industry and regulatory standards.
- A person cannot be assessed as competent until it can be demonstrated to the satisfaction of the approved aerospace assessor that the relevant elements and performance criteria of this unit of competency are being achieved under routine supervision on each type of system and on at least one (1) component of each group, as follows:
- Hydraulic systems – a system and at least one (1) component from each of the following hydro-mechanical system component groups:
- Hydraulic accumulators, filters, reservoirs, valves, pumps, motors, actuators, regulators and direct reading gauges.
- Rigid and flexible pipelines, hoses and fittings.
- Fuel systems – a system and at least one (1) component from each of the following fuel system component groups:
- Fuel system filters, valves, pumps, rigid and flexible storage cells/tanks.
- Rigid and flexible pipelines, hoses and fittings.
- Landing gear systems – each of the following systems:
- Retraction systems.
- Steering systems.
- Brake systems, including anti-skid, where applicable.
- Landing gear components – one (1) each of:
- Wheel assemblies.
- Brake units.
- Struts/oleos.
- Gaseous systems – each of the following systems:
- Pneumatic.
- Air cycle air conditioning.
- Pressurisation.
- Fire-extinguishing.
- Gaseous system components - at least one (1) component from each of the following gaseous system component groups:
- Gauges (direct reading), temperature sensors, pressurisation controllers and temperature controllers.
- Heat exchangers, pressure vessels, condensers, compressors, expansion turbines, humidifiers, valves and actuators.
- Rigid and flexible pipelines and fittings.
- Ducting.
- Mechanical systems – a mechanical operating and locking system and at least one (1) component from each of the following mechanical system component groups:
- Cables, pulleys, guides, fairleads, tension regulators, chains and sprockets.
- Push/pull rods, torque tubes, bellcranks, screwjacks, clutches, springs, bearings and gears.

This shall be proven via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.

- Individuals being assessed who have already attained the following related units will have met the Performance Criteria and Range of Conditions variables for Elements listed:
- Element 1 – any one of 101404 Inspect, test and troubleshoot aircraft hydro-mechanical and landing gear system and components, or MEA310 Inspect, test and troubleshoot aircraft pneumatic systems and components.
- Elements 2 and 3 – 101404 Inspect, test and troubleshoot aircraft hydro-mechanical and landing gear system and components, for hydro-mechanical system variables, and 101405 Inspect, test and troubleshoot aircraft pneumatic systems and components, for gaseous system variables.

The Log of Industrial Experience and Achievement records relating to the listed units may be accepted as also meeting the evidence requirements for this unit in the applicable Elements for systems and components as listed in the Range of Conditions variables.

**1. รหัสหน่วยสมรรถนะ** 101413

**2. ชื่อหน่วยสมรรถนะ** Test and troubleshoot gas turbine engine systems and components.

**3. ทบทวนครั้งที่** N/A

**4. สร้างใหม่** ☑ **ปรับปรุง** ☐

**5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)**

7232 Aircraft engine mechanics and fitters

**6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)**

This unit of competency employs hand skills, maintenance publications, and knowledge of gas turbine engine and system theory in the testing and troubleshooting of gas turbine engines and engine system components of fixed and rotary wing aircraft during scheduled or unscheduled maintenance. This work may be carried out individually or as part of a team.

**7. สำหรับระดับคุณวุฒิ**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

**8. กลุ่มอาชีพ (Sector)**

10 Aircraft Mechanics

**9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)**

102 Aircraft Mechanics: Helicopter

**10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)**

ICAO Doc 7192 / EASA Part 66

**11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)**

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101413.01<br>Test gas turbine engine system. | 101413.01.01 Aircraft and gas turbine engine system are correctly prepared according to applicable maintenance manual and connected to appropriate test equipment while noticing all relevant work health and safety (WHS) requirements, including the use of material safety data sheets (MSDS) and items of personal protective equipment (PPE).<br>101413.01.02 Built-in system test functions and status displays are activated, where relevant, outputs recorded and interpreted. Assistance is provided with gas turbine engine and/or system operation during prescribed test procedures to set up serviceability and correct function according to applicable maintenance manual. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101413.02<br>Troubleshoot gas turbine engine system. | 101413.02.01 Relevant maintenance documentation and modification status, including system defect reports, where appropriate, are interpreted to identify an unserviceability. Available information from maintenance documentation and inspection and test results is employed, where necessary, to assist in fault determination.<br>101413.02.02 Maintenance manual fault diagnosis guide and logical processes are employed to ensure efficient and accurate troubleshooting to line replacement level. Specialist advice is acquired, where necessary, to assist with the troubleshooting process. Gas turbine engine system faults are located and causes of the faults are clearly identified and correctly recorded in maintenance documentation, where required. Fault rectification requirements are determined to support in planning the repair or adjustment. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

**12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)**

101410 Inspect gas turbine engine systems and components

**13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)**

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

**14. หลักฐานที่ต้องการ (Evidence Guide)**

**(a) Performance Evidence**

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria under the indicated conditions of assessment, and must include:

- Applying relevant WHS procedures, including lifting and handling of heavy components.
- Using MSDS and PPE.
- Using relevant maintenance documentation and aircraft manuals to:
- Recognise through visual/physical inspection external and internal signs of defects in gas turbine engines, components and system components.
- Assist with testing of gas turbine engine and engine system operation, be able to operate systems, monitor indications, record parameters and recognise correct function.
- Compile engine condition monitoring records.
- Rig and adjust engine controls and systems.
- Using fault diagnosis guides and equivalent data, to accurately and efficiently troubleshoot the causes of unserviceability in gas turbine engines and engine systems, clearly record details and identify the required rectification actions.

The fundamental skills inherent in this unit should be transferable across a range of inspection, testing and troubleshooting tasks (including the timely involvement of supervisors or other trades) associated with engine systems. It is crucial that that system test procedures consider all safety precautions associated with gas turbine engine system operation, especially with regard to high-energy ignition units, and that awareness be demonstrated of dual inspection requirements associated with work on engine control systems.

It is essential to be able to interpret inspection procedures and specifications (allowable limits) and apply them in practice. This shall be demonstrated through application across a range of engine systems as specified in the Assessment Conditions.

**(b) Knowledge Evidence**

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include knowledge of:

- Fault diagnosis techniques.
- Gas turbine engine layout and operation:
- Types of gas turbine.
- Operating principles and power output.
- Gas path.
- Intakes.
- Compressors.
- Combustion chambers.
- Turbines.
- Exhaust.
- Thrust reversers.
- Accessory drives.
- Bearings and seals.
- Maintenance requirements and troubleshooting procedures.
- System and component operation, including electrical and instrument system interfaces:
- Fuel control and fuels.
- Lubrication and lubricants.
- Air distribution.
- Starting.
- Ignition.
- Power augmentation.
- Instrumentation:
- Performance indication.
- Condition indication..
- Warning
- Presentation and interpretation of electronic displays.
- Fire warning and extinguishing.
- Control system and rigging of engine controls.
- Engine spin/run procedures including the operation of auxiliary power units (APUs).
- Engine condition monitoring.
- Relevant WHS practices, including the requirements for the lifting and handling of heavy components.
- How to obtain MSDS.
- Selection and use of PPE.
- Relevant maintenance manuals.
- Relevant regulatory requirements and standard procedures.

**(c) Assessment recommendation**

N/A

**15. ขอบเขต (Range Statement)**

**(a) Recommendation**

Different working environments and conditions that may affect performance are admissible in this field. Crucial operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

**(b) Description**

Gas turbine engine systems include:

- Engine change unit, main components and accessories/drives.
- Control system.
- Ignition and starter systems.
- Fuel system.
- Oil system.
- Air system.

Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

**16. หน่วยสมรรถนะร่วม (ถ้ามี)**

N/A

**17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)**

N/A

**18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)**

- The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.
- Competency should be assessed in the work environment or simulated work environment using tools and equipment stated in aircraft maintenance manuals. It is also expected that applicable general-purpose tools, test and ground support equipment found in most routine situations would be used where appropriate.
- The level of troubleshooting is restrictedto its application to the use of fault diagnosis guides or other similar information.
- The application of testing procedures and functional rigging checks should also indicate knowledge of system operation. Before undertaking any action, engine system operation knowledge, the relationship of individual components and the links with other systems will be necessary to supplement evidence of ability to carry out rigging checks and troubleshoot the system within the limits of the aircraft/system fault-finding guide. The work plan should consider regulatory standards.
- A person cannot be assessed as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of the unit of competency are being achieved under routine supervision on at least one (1) item from each of the following groups:

Engine change unit, main components and accessories/drives

- Control system.
- Gnition and starter systems.
- Fuel system.
- Oil system.
- Air system.

This shall be proven via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.

**1. รหัสหน่วยสมรรถนะ** 101414

**2. ชื่อหน่วยสมรรถนะ** Repair and/or overhaul aircraft piston engine crankcase assembly components.

**3. ทบทวนครั้งที่** N/A

**4. สร้างใหม่** ☑ **ปรับปรุง** ☐

**5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)**

7232 Aircraft engine mechanics and fitters

**6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)**

This unit of competency applies hand skills and employs maintenance documentation/publications to repair and overhaul aircraft piston engine crankcase assembly components, during scheduled or unscheduled maintenance. Applications include components from fixed and rotary wing aircraft piston engines.This work may be carried out individually or as part of a team.

**7. สำหรับระดับคุณวุฒิ**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

**8. กลุ่มอาชีพ (Sector)**

10 Aircraft Mechanics

**9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)**

102 Aircraft Mechanics: Helicopter

**10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)**

ICAO Doc 7192 / EASA Part 66

**11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)**

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101414.01<br>Determine requirements. | 101414.01.01 Component defect reports (removal tags) or customer order are correctly interpreted and matched by part and serial numbers Crankcase assembly components are inspected and/or operated through prescribed test procedures to establish serviceability and confirm defects, if necessary, while observing relevant work health and safety (WHS) procedures, including the use of material safety data sheets (MSDS) and personal protective equipment (PPE).<br>101414.01.02 Modification status is clearly established to assist in determining the overhaul requirements for the components, and extent of overhaul or repair is identified and documented in accordance with standard enterprise procedures. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101414.02<br>Dismantle and inspect piston engine crankcase assembly components/parts. | 101414.02.01 Crankcase assembly component parts are dismantled in accordance with maintenance manual and/or enterprise procedures while observing relevant WHS procedures, including the use of MSDS and PPE.<br>101414.02.01 Component parts are assessed for serviceability in accordance with the relevant maintenance documentation and parts requiring specialist repair are tagged and repair instructions are specified in accordance with standard enterprise procedures.<br>101414.02.03 Parts requiring non-destructive testing (NDT) are prepared for testing in accordance with the relevant maintenance documentations and parts lists are compiled and processed in accordance with standard enterprise procedures. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |
| 101414.03<br>Repair and/or modify piston engine crankcase assembly components or parts. | 101414.03.01 Component parts are repaired or replaced in accordance with the relevant maintenance documentation.<br><br>101414.03.02 Modification of components is undertaken where required by reference to relevant manufacturer's bulletins or procedures, regulatory requirements and/or customer requirements while observing relevant WHS procedures, including the use of MSDS and PPE. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |
| 101414.04<br>Assemble, test and adjust piston engine crankcase assembly components. | 101414.04.01 Crankcase assembly component parts are assembled within specified tolerances and in accordance with the appropriate maintenance documents while observing relevant WHS procedures, including the use of MSDS and PPE.<br>101414.04.02 Components are tested, adjusted or calibrated to operate within prescribed specifications, crankcase assembly is prepared for engine reassembly , where components are not to be assembled into an engine the finished components are tagged, sealed and packaged in accordance with standard enterprise procedures. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

**12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)**

101301 Interpret work health and safety practices in aviation maintenance
101501 Plan and organise aviation maintenance work activity
101302 Apply quality standards applicable to aviation maintenance processes
101303 Interpret and use aviation maintenance industry manuals andspecifications
101304 Complete aviation maintenance industry documentation
101305 Perform basic hand skills, standard trade practices and fundamentals in aviation maintenance

**13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)**

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

**14. หลักฐานที่ต้องการ (Evidence Guide)**

**(a) Performance Evidence**

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria under the indicated conditions of assessment, and must include:

- Applying relevant WHS procedures, including the use of MSDS and PPE.
- Using relevant maintenance documentation, specifications and aircraft/component manuals to:
- Recognise state of serviceability and overhaul or repair requirements for piston engine.
- Crankcase assembly components as listed in the Range of Conditions.
- Dismantle and inspect crankcase assembly component parts for serviceability and.
- Identify repair requirements as applicable.
- Repair/replace/modify crankcase component parts.
- Assemble, test for correct operation and adjust crankcase assembly components.
- Correctly tagging, sealing and packaging completed components.

Evidence of transferability of skills and knowledge related to repair is essential. This shall bedemonstrated through application across a number of different piston engine crankcaseassembly components. Ability to assess component serviceability and interpret partsrequirements will be necessary to supplement the required evidence. Capability to interpretinspection procedures and specifications (allowable limits) and apply them in practice iscritical. The application of testing procedures should also clearly indicate basic knowledge ofcrankcase assembly operation.

**(b) Knowledge Evidence**

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria and include basic knowledge of:

- How to obtain relevant MSDS.
- The use of applicable items of PPE.
- WHS procedures.
- Component inspection and wear measurement procedures.
- Non-destructive testing methods and application.
- Component repair and overhaul procedures and processes.

**(c) Assesment Recommendation**

N/A

**Assessment Methods**

**15. ขอบเขต (Range Statement)**

**(a) Recommendation**

Different working environments and conditions that may affect performance are admissible in this field. Crucial operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

**(b) Description**

Piston engine crankcaseassembly componentsinclude:

- Crankshaft, gears, con rods and counterweights.
- Camshaft, hydraulic tappets/cam followers and gears.

- Propeller shaft, reduction drive gear and quill shaft.
- Component gear drives/trains.
- Crankcase castings, bearings, component mounting pads and studs.
- Oil system components.
- Supercharger and turbocharger components (where applicable to the enterprise).
- Propeller governor (where applicable to the enterprise).

Testing and adjustment:

- Complex testing and adjusting of components, where required, will be carried out under supervision at the appropriate level.

Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

**16. หน่วยสมรรถนะร่วม (ถ้ามี)**

N/A

**17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)**

N/A

**18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)**

- The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.
- Competency should be assessed in the workplace or simulated workplace using tools and equipment stated in maintenance manuals. It is also expected that general-purpose tools, test and ground support equipment found in most routine situations would be used where appropriate.
- Knowledge of crankcase assembly operation and the relationship of individual components will be necessary to supplement evidence of ability to troubleshoot component faults before undertaking any action. The work plan should take account of applicable safety and quality requirements in accordance with the industry and regulatory standards.
- A person cannot be assessed as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements of the unit of competency and the performance criteria are being achieved under routine supervision on at least one (1) item from each of the following groups:
- Crankshaft, gears, con rods and counterweights.
- Camshaft, hydraulic tappets/cam followers and gears.
- Propeller shaft, reduction drive gear and quill shaft.
- Component gear drives/trains.
- Crankcase castings, bearings, component mounting pads and studs oil system components.
- Supercharger and turbocharger components (may be omitted where not applicable to the enterprise).
- Propeller governor (may be omitted where not applicable to the enterprise).
- This shall be proven via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.

**1. รหัสหน่วยสมรรถนะ** 101415

**2. ชื่อหน่วยสมรรถนะ** Maintain aircraft vapour cycle air conditioning systems.

**3. ทบทวนครั้งที่** N/A

**4. สร้างใหม่** ☑ **ปรับปรุง** ☐

**5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)**

7232 Aircraft engine mechanics and fitters

**6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)**

This unit of competency requires the application of hand skills, the use of maintenance publications and basic knowledge of air conditioning systems with steam pump to inspect, test and troubleshoot systems, and for removing and installing the mechanical and electrical components of the system during the performance of scheduled or unscheduled maintenance. Maintenance can be done individually or as part of a team. Compliance with applicable regulations is required where refrigerant evacuation and recharging is performed. Applications include all aircraft vapour cycle air conditioning systems and components.

**7. สำหรับระดับคุณวุฒิ**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

**8. กลุ่มอาชีพ (Sector)**

10 Aircraft Mechanics

**9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)**

101 Aircraft Maintenance: Airplane
102 Aircraft Maintenance:Helicopter

**10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)**

ICAO Doc 7192 / EASA Part 66

**11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)**

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101415.01<br>Inspect vapour cycle air conditioning systems. | 101415.01.01 Isolation tags already attached to the system or related systems are checked and aircraft/engine configured for safe system inspection and operation in accordance with applicable maintenance manual.<br>101415.01.02 Vapour cycle air conditioning systems are visually or physically checked for external and internal signs of defects in accordance with applicable maintenance manual while observing all relevant work health and safety (WHS) requirements, including the use of material safety data sheets (MSDS) and items of personal protective equipment (PPE). | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101415.02<br>Test vapour cycle air conditioning systems. | 101415.02.01 Aircraft and system are correctly prepared in accordance with applicable maintenance manual.<br>101415.02.02 Vapour cycle air conditioning system is tested in accordance with prescribed test procedures to establish serviceability and correct function in accordance with applicable maintenance manual. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |
| 101415.03<br>Troubleshoot vapour cycle air conditioning. | 101415.03.01 Available information from maintenance documentation and inspection and test results is used, where necessary, to assist in fault determination , maintenance manual fault diagnosis guide and logical processes are used to ensure efficient and accurate troubleshooting to line replacement level.<br>101415.03.02 Specialist advice is obtained, where required, to assist with the troubleshooting process Vapour cycle air conditioning system faults are located and the causes of the faults are clearly identified and correctly recorded in maintenance documentation, where required and fault rectification requirements are determined to assist in planning the repair. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |
| 101415.04<br>Remove vapour cycle air conditioning system components. | 101415.04.01 Aircraft and vapour cycle air conditioning system is rendered safe in accordance with the applicable maintenance manual and isolation tags are fitted, where necessary, to ensure the safety of personnel and freedom from damage during component removal , where refrigerant evacuation is necessary, evacuation is performed in accordance with regulatory requirements and maintenance manual procedures<br>101415.04.02 Component removal is carried out in accordance with the applicable maintenance manual while observing all relevant WHS requirements, including the use of MSDS and items of PPE, component is tagged and prepared for transport or storage in accordance with the specified procedures Required maintenance documentation is completed and processed in accordance with standard enterprise procedures | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 101415.05<br>Install vapour cycle air conditioning system components. | 101415.05.01 Component to be installed is checked to confirm correct part or model numbers, modification status and serviceability, and installation is carried out in accordance with the applicable maintenance manual while observing all relevant WHS requirements, including the use of MSDS and items of PPE.<br>101415.05.02 Vapour cycle air conditioning system is recharged with refrigerant, where necessary, in accordance with maintenance manual procedures and regulatory requirements. Vapour cycle air conditioning system is tested for correct function and freedom from refrigerant leaks if system recharging has been performed, and required maintenance documentation is completed and processed in accordance with standard enterprise procedures. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

**12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)**

101309 Remove and install miscellaneous aircraft electrical hardware/components

101403 Minor repair for aircraft electrical components or parts

**13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)**

(ก) ความต้องการด้านทักษะ

-

(ข) ความต้องการด้านความรู้

-

**14. หลักฐานที่ต้องการ (Evidence Guide)**

**(a) Performance Evidence**

Evidence required to demonstrate competency in this unit should be of interest and meet all requirements of the elements and performance criteria under the specified conditions assessment, and should include:

- Applying relevant WHS procedures, including the selection and use of applicable PPE and MSDS.
- Complying with regulatory requirements regarding the de-gassing of vapour cycle air conditioning systems.
- Using relevant maintenance documentation and aircraft manuals.
- Recognising external and internal signs of defects in vapour cycle air conditioning systems and system components through visual/physical inspection.
- Testing of vapour cycle air conditioning system operation, be able to operate systems and leak testing equipment, monitor indications and recognise correct function.
- Using specialist equipment to evacuate and recharge refrigerant.
- Using fault diagnosis guides and equivalent data to accurately and efficiently troubleshoot the causes of unserviceabilities in vapour cycle air conditioning systems, clearly recording details and identifying the required rectification actions.
- Correctly removing and installing vapour cycle air conditioning system electrical and mechanical components.

The inherent underlying skills to this unit should be transferable across a range of inspection, testing, and troubleshooting tasks removal and installation (including the timely intervention of supervisor or other trades) associated with the systems and components of air conditioning steam cycle. It is essential that the testing procedures system takes into account all safety precautions associated with the operation and system testing vapor cycle air conditioning, and regulations related to the evacuation and recharge refrigerant is strictly observed. Ability to interpret procedures and specifications (allowable limits) inspection and apply them in practice is essential.

This is demonstrated by the application through a series of air conditioning systems steam cycle of the aircraft.

**(b) Knowledge Evidence**

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include basic knowledge of:

- WHS procedures associated with vapour cycle air conditioning system maintenance, including the selection and use of PPE.
- How to obtain applicable MSDS.
- Regulations applying to the evacuation and recharging of refrigerant.
- Fault diagnosis techniques.
- Vapour cycle air conditioning system layout and operation.
- Vapour cycle air conditioning system electrical and mechanical component operation:
- Compressor .
- Condenser.
- Receiver dryer.
- Thermal expansion valve.
- Evaporator.
- Magnetic clutch and drive system:
- Belt.
- Power takeoff.
- Electric motor.
- Hydraulic motor.
- Pneumatic.
- Condenser extension and retraction system.
- Blower.
- Throttle system shutoff.
- Temperature control system.
- Refrigerant used in aircraft vapour cycle air conditioning systems.
- Lubricants used in compressors.
- Equipment used to test systems and evacuate and recharge refrigerant.
- Procedures for evacuating and recharging system refrigerant.
- Refrigerant leak testing techniques and equipment.
- Removal and installation procedures for vapour cycle air conditioning system components.
- Vapour cycle air conditioning system maintenance requirements.
- Relevant maintenance manuals.
- Relevant regulatory requirements and standard procedures.

**(c) Assessment recommendation**

N/A

**Assessmen methods**

N/A

## 15. ขอบเขต (Range Statement)

**(a) Recommendation**

This field allows different environments and working conditions that can affect the performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.
Vapour cycle air conditioning systems include:

- Refrigeration system compressor, condenser, receiver dryer, thermal expansion valve and evaporator
- Magnetic clutch and drive system (belt, power take-off, electric motor, hydraulic motor or pneumatic as applicable)
- Condenser extensionand retraction system
- Blower
- Throttle system shutoff
- Temperature control system

Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise

**(b) Description**

N/A

**16. หน่วยสมรรถนะร่วม (ถ้ามี)**

N/A

**17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)**

N/A

**18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)**

• The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.Competence should be assessed in the work environment or simulated work environment using tools and equipment specified in the maintenance documentation. It is also expected that general purpose tools and test equipment found in most routine situations would be used if necessary.

• The application of test procedures and functional checks must show basic knowledge of the operation and regulation relating to the refrigerant fluid system. Vapor cycle air conditioning basic knowledge of system operation, the relationship of the individual components and the links with other systems will be needed to complete the proof of the ability to carry out checks of the engine control system and troubleshoot the system within aircraft / research guide of system failures before undertaking any action. The work plan should take account of safety and quality requirements in compliance with industry and regulatory standards.

• The following conditions assessment are the requirements of regulators and stakeholders and maintenance must be strictly observed.

• A person can not be assessed as competent until it can be demonstrated to the satisfaction of the assessor in the workplace that the relevant elements and performance criteria of competence unit are achieved under the supervision routine on a system and at least one (1) each of the following components:

• Compressor refrigeration system, condenser, receiver dryer, a thermal expansion valve and the evaporator.

• Magnetic clutch and drive system (belt, PTO, electric, hydraulic or pneumatic motor as appropriate).

• Condenser extension and retraction system.

• Blower.

• Stop throttle system.

• Temperature control system.

• This are established through the records in the newspaper industry experience and yield or, where appropriate, a guide on evidence of equivalent industry (for details refer to the Companion Volume Assessment Guidelines ).

**1. รหัสหน่วยสมรรถนะ** 102401

**2. ชื่อหน่วยสมรรถนะ** Inspect, test and troubleshoot rotary wing rotor and control systems and components.

**3. ทบทวนครั้งที่** N/A

**4. สร้างใหม่** ☑ **ปรับปรุง** ☐

**5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)**

7232 Aircraft engine mechanics and fitters

**6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)**

This unit of competency employs hand skills, maintenance publications, and knowledge of rotors and rotor control system theory in the inspection, testing and troubleshooting of rotary wing aircraft rotors and rotor control systems during scheduled or unscheduled maintenance. This work may be carried out individually or as part of a team.

**7. สำหรับระดับคุณวุฒิ**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

**8. กลุ่มอาชีพ (Sector)**

10 Aircraft Mechanics

**9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)**

N/A

**10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)**

ICAO Doc 7192 / EASA Part 66

**11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)**

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 102401.01<br>Inspect and ground rotor and rotor control systems and components. | 102401.01.01 Isolation and warning signs are attached/installed to the system or related systems and the aircraft configured for safe system inspection and operation according to relevant aircraft publications/maintenance regulations orders and standards and practices. Rotor and rotor control system is visually or physically checked/inspected for external signs of defects according to relevant aircraft publications maintenance regulations/orders and standards and practices while noticing all relevant work health and safety (WHS) requirements. Defects are identified and recorded according to standard enterprise procedures.<br>102401.01.02 Aircraft and system prepared according to relevant aircraft publications/maintenance regulations orders and standards and practices for the operation of engine and rotor system. Rotor and rotor control system are functionally tested according to relevant aircraft publications maintenance regulations/orders and standards and practices for indication of malfunction. System calibration or adjustments are performed in accordance with relevant aircraft publications/maintenance regulations/orders and standards and practices. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |
| 102401.02<br>Troubleshoot rotor and rotor control systems. | 102401.02.01 Relevant aircraft publications and modification status, including system defect reports, are interpreted to identify an unserviceability. Available information from aircraft maintenance documentation, inspection and test results is employed to assist in fault determination. Relevant aircraft publication fault diagnosis guide and logical processes are employed to ensure efficient and accurate troubleshooting to line replacement level. Specialist advice is acquired to assist with the troubleshooting process.<br>102401.02.02 Rotor and rotor control system faults are located and the causes of the faults are clearly identified and recorded in aircraft maintenance documentation according to standard enterprise procedures. Fault rectification requirements are determined. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

**12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)**

102301 Remove and install rotary wing rotor and flight control system components

**13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)**

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

**14. หลักฐานที่ต้องการ (Evidence Guide)**

**(a) Performance Evidence**

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria under the indicated conditions of assessment, and must include:

- Applying relevant WHS procedures.
- Using relevant maintenance documentation and aircraft manuals to:
- Recognise through visual/physical inspection external signs of defects in the rotor, rotor head, tail rotor and flight control mechanical system components.
- Ground test the rotor and control system and recognise correct function.
- Rig and adjust rotor controls and systems.
- Using fault diagnosis guides and equivalent data to accurately and efficiently troubleshoot the causes of unserviceability in rotor control systems, clearly record details and identify the required rectification actions.

The fundamental skills inherent in this unit should be transferable across a range of inspection, testing and troubleshooting tasks (including the timely involvement of supervisors or other trades) associated with the rotor control systems. It is crucial that testing procedures consider all safety precautions associated with ground testing of rotor and rotor control systems, and that awareness be demonstrated of dual inspection requirements associated with work on control systems.

It is essential to be able to interpret inspection procedures and specifications (allowable limits) and apply them in practice. This shall be demonstrated through application across a range of systems as specified in the Assessment Conditions.

**(b) Knowledge Evidence**

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria and include knowledge of:

- Fault diagnosis techniques.
- Standard trade practices relating to tool and test/rigging equipment usage.
- Theory of flight:
- Airflow.
- Conditions of flight.
- Lift and forces.
- Drag.
- Rotary flight principles:
- Terminology relating to:
- Aerofoils.
- Main rotor blades.
- Rotor discs.
- Rotors – main and tail.
- Aerodynamic characteristics:
- Aerofoil design.
- Forces.
- Rotor thrust and power requirements.
- Vortex ring.
- Autorotation.
- Helicopter stability.
- Helicopter dynamic components:
- Main rotors:
- Blades.
- Heads.
- Linkages.
- Tail rotors.
- Swash plates.
- Transmissions and drive shafts.
- Clutches and freewheeling units.
- System and component operation, including electrical and instrument system interfaces:
- Cyclic pitch control.
- Collective pitch control.
- Tail rotor control.
- Mechanical and powered control systems.
- Engine control interface.
- Torque reaction and anti-torque devices.
- Engine indication.
- Vibration monitoring.
- Helicopter maintenance procedures and troubleshooting.
- Relevant maintenance manuals.
- Relevant regulatory requirements and standard procedures including requirements forengine and rotor system operation.
- Relevant WHS practices.

**(c) Assessment recommendation**

N/A

**15. ขอบเขต (Range Statement)**

**(a) Recommendation**

Different working environments and conditions that may affect performance are admissible in this field. Crucial operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

**(b) Description**

Rotor and rotor control systems include:

- Main rotor blades and tail rotor blades.
- Rotor heads, swash plates and tail rotor pitch control assemblies.
- Mechanical, powered flight control components.
- Main rotor, intermediate or tail rotor gearboxes.
- Drive shafts and couplings .

Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise .

**16. หน่วยสมรรถนะร่วม (ถ้ามี)**

N/A

**17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)**

N/A

**18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)**

- The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.
- Competency should be assessed in the work environment or simulated work environment, using tools and equipment stated in aircraft maintenance manuals. It is also expected that applicable general-purpose tools, test and ground support equipment found in most routine situations would be used where appropriate.
- The application of ground testing procedures should clearly indicate knowledge of system operation. Before undertaking any action, system operation knowledge, the relationship of individual components and the links with other systems will be necessary to supplement evidence of ability to troubleshoot the system within the limits of the aircraft/system fault-finding guide. The work plan should consider applicable safety and quality requirements according to the industry and regulatory standards.
- Functional testing of rotors and rotor control systems with engine/s running may be performed with the applicant directing a pilot qualified on type.
- A person cannot be assessed as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of the unit of competency are being achieved under routine supervision on at least one (1) item from each of the following groups:
- Main rotor blades and tail rotor blades.
- Rotor heads, swash plates and tail rotor pitch control assemblies.
- Mechanical, powered flight control components.
- Main rotor, intermediate or tail rotor gearboxes.
- Drive shafts and couplings.

This shall be proven via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.

- Individuals being assessed who have already attained 102303 Maintain basic rotary wing aircraft systems will have satisfied the requirements of this unit with regard to common Range of Conditions variables. The Log of Industrial Experience and Achievement records relating to 102303 Maintain basic rotary wing aircraft systems may be accepted as also meeting the evidence requirements for this unit in the applicable common areas.

**1. รหัสหน่วยสมรรถนะ** 103302

**2. ชื่อหน่วยสมรรถนะ** Remove and install advanced aircraft electrical system components.

**3. ทบทวนครั้งที่** N/A

**4. สร้างใหม่** ☑ **ปรับปรุง** ☐

**5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)**

7232 Aircraft engine mechanics and fitters

**6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)**

This skill unit requires the use of workforce skills and use of maintenance documentation / publications in the removal and installation of advanced equipment from alternating current (AC) and direct current (DC) components the direct system of fixed and rotary wing aircraft have both AC and DC electrical systems during scheduled or unscheduled maintenance. The work can be done individually or as part of a team.

**7. สำหรับระดับคุณวุฒิ**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

**8. กลุ่มอาชีพ (Sector)**

7232 Aircraft Mechanics

**9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)**

N/A

**10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)**

ICAO Doc 7192 / EASA Part 66

**11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)**

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 103302.01<br>Remove AC and DC aircraft electrical system components. | 103302.01.01 System is rendered safe and prepared in accordance with the applicable maintenance manual and isolation tags are fitted, where necessary, to ensure personnel safety, and electrical component removal is carried out in accordance with the applicable maintenance manual while observing all relevant work health and safety(WHS) requirements.<br>103302.01.02 Required maintenance documentation is completed and processed in accordance with standard enterprise procedures. Removed components are tagged and packaged in accordance with specified procedures. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 103302.02<br>Install AC and DC aircraft electrical system components. | 103302.02.01 Electrical components to be installed are checked to confirm correct part numbers, modification status, serviceability and shelf life. Physical installation of electrical components is performed in accordance with the applicable maintenance manual, ensuring appropriate adjustment/alignment with mechanical interface is carried out.<br>103302.02.02 System is reinstated to correct operational condition in preparation for testing, as necessary. Required maintenance documentation is completed and processed in accordance with standard enterprise procedures. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

**12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)**

101309Remove and install miscellaneous aircraft electrical hardware/components

**13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)**

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

**14. หลักฐานที่ต้องการ (Evidence Guide)**

**(a) Performance Evidence**

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria under the specified conditions of assessment, and include:

• Identifying/locating:

• DC power regulation, distribution and control systems and components, i.e. regulators and bus bars.

• AC power regulation, distribution and control systems and components, i.e. generator control units.

• Various types of inverters and transformer rectifier units.

• Gas turbine and piston engine ignition and starting systems and components (where applicable to the enterprise).

• Batteries (lead acid and nickel cadmium) and associated mounting equipment including related anti-vibration aids and battery temperature monitoring systems.

• Flight control servo actuating devices, i.e. AC and DC electro-mechanical, electro-pneumatic, electro-hydraulic, duplex servomotors, power control units and trim control devices.

• Electrical components of aircraft systems, such as air cycle air conditioning, anti-icing and de-icing, landing gear, anti-skid, flight control, master and central warning, fuel storage and distribution, external and internal lighting, fire warning and extinguishing, and engine/propeller control (where applicable to the enterprise).

• Correctly connecting.

• DC generators.

• Star or delta alternators to star and delta loads.

• Starter generators.

• AC motors.

• Polyphase motors.

• Applying relevant WHS practices. It is essential that cleanliness requirements and safety precautions applicable to the system being maintained are fully observed, understood and complied with, as well as work practices associated with electrostatic sensitive devices. Evidence of transferability of skills and knowledge related to removal and installation is essential. This is to be demonstrated by application across a range of aircraft major electrical system components encompassing electrical with mechanical interface and installations that require alignment and/or adjustment (mechanical or electrical).

**(b) Knowledge Evidence**

Evidence required to demonstrate competency in this unit must be relevant to and satisfy all of the requirements of the elements and performance criteria and include basic knowledge of:

• Component attachment methods.

• Connection of hardware and plugs.

• Relevant WHS practices.

• The use of approved maintenance documentation and aircraft publications relating. to AC and DC electrical systems.

• Properties of permanent magnets.

• Precautions for the care and storage of permanent magnets.

• Bonding of aircraft components and lightning protection.

• General construction, operating characteristics and applications for aircraft:.

• GGenerators.

• Fartheerlternators.

• AC and DC motors.

• Transformer rectifier units

• Rotary and static inverters.

• Batteries.

• Linear and rotary actuators.

• Relevant maintenance manuals.

• Relevant regulatory requirements and standard procedures.

• Environmental protection requirements relating to Halon fire extinguishers (e.g. Bromochlorodifluoromethane (BCF)).

**15. ขอบเขต (Range Statement)**

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

**Electrical system components include:**

• DC and AC power generation and distribution system components, including generators and related multi-sourced DC power generation, starter generators alternators and regulation, and control and distribution system components.

• Transformer rectifier units and/or inverters.

• Batteries and related bus tie or interlock system components and battery temperature monitoring systems.

• Motors and actuators.

• Components of gas turbine and/or piston engine ignition and starting systems (where applicable to the enterprise).

• External/internal lights.

• Electrical components of specific electrical systems, such as air cycle air conditioning, combustion heaters, equipment cooling, anti-icing and de-icing, landing gear, anti-skid, flight control, master and central warning, fuel storage and distribution, fire warning and extinguishing, and engine/propeller control (where applicable to the enterprise).

**Procedures and requirements include:**

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

**16. หน่วยสมรรถนะร่วม (ถ้ามี)**

N/A

**17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)**

N/A

**18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)**

• The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.

• Competency should be assessed in the work environment or simulated work environment, using tools and equipment specified in maintenance manuals. It is also expected that general-purpose tools, test and ground support equipment found in most routine maintenance situations would be used where appropriate.

• An understanding of the attachment methods, connection of hardware, and the need for adjustment or rigging and system operation as they relate to the work must be demonstrated before undertaking any action. The work plan should take account of applicable safety and quality requirements in accordance with the industry and regulatory standards.

• A person cannot be assessed as competent until it can be demonstrated to the satisfaction of the workplace assessor, that the relevant elements and performance criteria of the unit of competency are being achieved under routine supervision on at least one (1) component from:

• DC and AC power generation and distribution system components, including generators and related multi-sourced DC power generation, starter generators alternators and regulation, and control and distribution system components.

• Transformer rectifier units and/or inverters.

• Batteries and related bus tie or interlock system components and battery temperature monitoring systems.

• Motors and actuators.

• Components of gas turbine and/or piston engine ignition and starting systems (may be omitted where not applicable to the enterprise).

• External/internal lights.

• And on three (3) components that are applicable to the enterprise from:

• Electrical components of specific electrical systems, such as air cycle air conditioning, combustion heaters, equipment cooling, anti-icing and de-icing, landing gear, anti-skid, flight control, master and central warning, fuel storage and distribution, fire warning and extinguishing and engine/propeller control.

• This shall be established via records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide (for details refer to the Companion Volume Assessment Guidelines).

**1. รหัสหน่วยสมรรถนะ** 103401

**2. ชื่อหน่วยสมรรถนะ** Inspect, test and troubleshoot basic aircraft electrical systems and components.

**3. ทบทวนครั้งที่** N/A

**4. สร้างใหม่** ☑ **ปรับปรุง** ☐

**5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)**

7232 Aircraft engine mechanics and fitters

**6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)**

This unit of competency requires the application of manual skills and the use of the knowledge system / components and equipment applicable to inspect, test and troubleshoot systems direct current (DC) electric aircraft and aircraft components rotary wing test fixed and having only DC electrical systems during scheduled or unscheduled maintenance. The work can be done individually or as part of a team.

**7. สำหรับระดับคุณวุฒิ**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

**8. กลุ่มอาชีพ (Sector)**

10 Aircraft Mechanics

**9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)**

103 Aircraft Maintenance: Avionic

**10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)**

ICAO Doc 7192 / EASA Part 66

**11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)**

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 103401.01<br>Inspect DC aircraft electrical systems and components. | 103401.01.01 Documentation for maintenance and modification status, including reports of system defects if any, are used to identify specific inspection requirements. Isolation tags are checked and aircraft configured for safe system inspection and operation in accordance with the applicable maintenance manual.<br>103401.01.02 DC electrical system visually or physically checked for external signs of defects in accordance with the maintenance manual applicable to observe all safety requirements (WHS) and the relevant occupational health, and defects are correctly identified and reported. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 103401.02<br>Test/adjust DC aircraft electrical systems. | 103401.02.01 Aircraft and system are prepared in accordance with applicable maintenance manual for the application of power system operation.<br><br>103401.02.02 Electrical system is functionally tested in accordance with maintenance manual for evidence of serviceability or malfunction , and system calibration or adjustments are performed in accordance with maintenance manual, as appropriate. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |
| 103401.03<br>Troubleshoot DC aircraft electrical systems. | 103401.03.01 Available information from maintenance documentation and inspection and test results is used, where necessary, to assist in fault determination. Maintenance manual fault diagnosis guides and logic processes are used to ensure efficient and accurate troubleshooting to line replacement level.<br>103401.03.02 Specialist advice is obtained, where required, to assist with the troubleshooting process. system failures are and the causes of faults are clearly identified and recorded properly in the maintenance documentation, where necessary and in accordance with standard procedures for companies, and rectification requirements are determined. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

**12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)**

N/A

**13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)**

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

**14. หลักฐานที่ต้องการ (Evidence Guide)**

**(a) Performance Evidence**

Recognition system components and defects / external damage, correct installation, connection plugs, terminals, attaching hardware (including cabling / harnesses) and safety:

- DC power generation systems, including regulation, distribution and control.
- Battery installations.
- Piston engine ignition and starting systems and components:
- Magnetos or coils.
- Starter motors.
- Ulgnition switches/start switches.
- Ignition harnesses.
- Low tension wiring.
- Spark plugs.
- Auxiliary starting devices.
- Gas turbine engine ignition and starting systems (where applicable to the enterprise):
- Starter motors and starter/generators.
- High energy ignition units.
- Control units.
- Switches.
- Batteries and associated mounting equipment, including related anti-vibration aids.
- Motors and actuators in DC electrical systems.
- Internal/external lighting systems, including controls.
- Flap systems.
- Landing gear systems.
- Applying logic processes, taking and interpreting electrical measurements, and using test equipment and appropriate wiring diagrams and manuals to isolate malfunctions in the above systems.
- Performing system functional tests and checks to isolate system faults and assess post-maintenance serviceability.

Aapplying relevant WHS practices, including those relating to gas turbine engine high energy ignition units.

It is essential that the system test procedures, cleaning requirements and safety measures applicable to electrical system are maintained are fully observed, understood and respected. Ability to interpret procedures and specifications (allowable limits) inspection and apply them in practice through a series of inspections, testing and troubleshooting applications (including the appropriate involvement of supervisors and other trades) is critical. Evidence of transferability of skills and knowledge related to the inspection, testing and troubleshooting is essential. This is to be demonstrated by the application in a wide range of aircraft electrical systems and components listed in the range of conditions.

**(b) Knowledge Evidence**

Evidence required to demonstrate competency in this unit should be of interest and meet all requirements of the elements and performance criteria and include basic knowledge of:

- DC circuit theory.
- Electrical system maintenance requirements and troubleshooting procedures.
- The basic layout (block diagram level), function and operation of:
- Single generator DC power generation and distribution systems and components, including:
- DC generators.
- Alternator/rectifier generators.
- Starter/generators.
- Voltage regulators.
- Circuit protection devices.
- Bus bars.
- Piston engine ignition and starting systems and components, including:
- Magnetos or coils.
- Starter motors.
- Ignition switches/start switches.
- Ignition harnesses.
- Low tension wiring.
- Spark plugs.
- Auxiliary starting devices.
- Gas turbine igniter and starting systems and components, including specific WHS precautions:
- Starter motors and starter/generators.
- High energy ignition units.
- Control units.
- Switches.
- Landing gear and flap systems and components, including:

Mmotors.

- Actuators.
- Selector switches.
- Micro switches.
- Internal and external lighting systems and components.
- Batteries and associated mounting equipment, including related anti-vibration aids.
- Relevant WHS practices.
- Relevant maintenance manuals.
- Relevant regulatory requirements and standard procedures.

**(c) Assessment recommendation**

N/A

**Assessmen methods**

**15. ขอบเขต (Range Statement)**

**(a) Recommendation**

| This field allows different environments and working conditions that can affect the performance. the essential operating conditions that may be present (depending on the work situation, accessibility requirements, the candidate of the topic, and local industry and regional contexts) are included. | |
|---|---|
| **DC electrical systems/components include:** | DC generators and alternator/rectifier generators, and components of related single generator regulation and distribution systems.<br>• Piston engine ignition and starting system components.<br>• Specific components of DC electrical systems, such as flaps and landing gear, including related motors and actuators.<br>• Gas turbine engine igniter and starting systems and components (where applicable to the enterprise).<br>• Aircraft lighting.<br>• Aircraft main batteries. |
| **Procedures and requirements include:** | • Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise. |

**(b) Description**

N/A

**16. หน่วยสมรรถนะร่วม (ถ้ามี)**

N/A

**17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)**

N/A

**18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)**

The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.Competition should be assessed in the workplace or place of work simulated using tools and equipment specified in the maintenance manuals. It is also expected that the tools of general and special purpose test equipment and ground support would be used where appropriate.

- The application of the test procedures should clearly indicate the knowledge of system operation, the relationship of the individual components and linkages with other systems (if applicable) within the limits of the failure of the aircraft / search system guidance before taking any action. The work plan should take into account the applicable safety requirements and quality in accordance with industry and regulatory standards.
- A person can not be assessed as competent until they can demonstrate to the satisfaction of the assessor workplace relevant elements and performance criteria of competence unit is carried out under routine monitoring in power looms, cables and connecting hardware, and each set in the range of conditions and at least one (1) main / online replaceable component unit (LRU), in each case as follows:
- DC generators and generators alternator / rectifier current, and control system components single generator and related distribution.
- System components engine ignition and starting piston.
- Specific components of electrical current systems, such as flaps and landing gear, including motors and actuators.
- Lighter gas turbine engine and commissioning of systems and components (can be omitted if not applicable to the company).
- Lighting aircraft.
- The main aircraft batteries (competition can be demonstrated by conducting a review of the battery).
- This is done through the records in the register of industrial experience and achievement or, where appropriate, a guide equivalent Industry Evidence (for details see the companion volume Assessment Guidelines).
- People who have already reached evaluated Keep MEA274 light aircraft electrical systems and core components have met the requirements of this unit with respect to the common range of varying conditions. The Registry of industry experience and accomplishments related records Keep MEA274 be accepted as meeting the requirements of evidence for this unit in public areas apply the basic light aircraft electrical systems and components.

**1. รหัสหน่วยสมรรถนะ** 103402

**2. ชื่อหน่วยสมรรถนะ** Inspect aircraft electrical systems and components.

**3. ทบทวนครั้งที่** N/A

**4. สร้างใหม่** ☑ **ปรับปรุง** ☐

**5. สำหรับชื่ออาชีพและรหัสอาชีพ (Occupational Classification)**

7232 Aircraft engine mechanics and fitters

**6. คำอธิบายหน่วยสมรรถนะ (Description of Unit of Competency)**

This unit of competency applies hand skills and employs system/component knowledge and applicable maintenance publications in the inspection of aircraft electrical systems and components of fixed and rotary wing aircraft during scheduled or unscheduled maintenance. This work may be carried individually or as part of a team.

**7. สำหรับระดับคุณวุฒิ**

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| ☐ | ☐ | ☐ | ☑ | ☐ | ☐ | ☐ | ☐ |

**8. กลุ่มอาชีพ (Sector)**

10 Aircraft Mechanics

**9. ชื่ออาชีพและรหัสอาชีพอื่นที่หน่วยสมรรถนะนี้สามารถใช้ได้ (ถ้ามี)**

N/A

**10. ข้อกำหนดหรือกฎระเบียบที่เกี่ยวข้อง (Licensing or Regulation Related) (ถ้ามี)**

ICAO Doc 7192 / EASA Part 66

**11. สมรรถนะย่อยและเกณฑ์การปฏิบัติงาน (Elements and Performance Criteria)**

| สมรรถนะย่อย (Element) | เกณฑ์ในการปฏิบัติงาน (Performance Criteria) | วิธีการประเมิน (Assessment) |
|---|---|---|
| 103402.01<br>Inspect electrical systems and components. | 103402.01.01 Isolation tags are checked and aircraft configured for safe system inspection and operation according to the applicable maintenance manual.<br>103402.01.02 Electrical system components are visually or physically checked for external signs of defects according to applicable maintenance manual while noticing all relevant work health and safety (WHS) requirements. Defects are correctly identified and recorded according to standard enterprise procedures. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |
| 103402.02<br>Inspect electrical components. | 103402.02.01 Isolation tags are checked and aircraft configured for safe system inspection and operation according to the applicable maintenance manual.<br>103402.02.02 Electrical hardware are visually or physically checked for external signs of defects according to applicable maintenance manual while noticing all relevant work health and safety (WHS) requirements. Defects are correctly identified and recorded according to standard enterprise procedures. | ข้อสอบข้อเขียน<br>การสัมภาษณ์<br>การสาธิตการปฏิบัติงาน |

**12. ความรู้และทักษะก่อนหน้าที่จำเป็น (Pre-requisite Skill & Knowledge)**

103302Remove and install advanced aircraft electrical system components

101403 Fabricate and/or repair aircraft electrical components or parts

**13. ทักษะและความรู้ที่ต้องการ (Required Skills and Knowledge)**

(ก) ความต้องการด้านทักษะ

See Appendix A

(ข) ความต้องการด้านความรู้

See Appendix A

**14. หลักฐานที่ต้องการ (Evidence Guide)**

**(a) Performance Evidence**

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria under the indicated conditions of assessment, and must include:

- Applying relevant WHS practices.
- Using approved maintenance documentation and aircraft publications relating to the avionic system being maintained.
- Recognition of system and electrical component defects/external damage, correct installation, connection of plugs, terminations, and attaching hardware (including cabling/harnesses) and security in:
- AC and DC power generation systems, including regulation, distribution, control and Cooling.
- Battery installations and inverters.
- Flight control and/or electro-hydraulic systems.
- Engine ignition, starting, fuel distribution and control systems.
- Internal/external lighting systems, including controls.
- Doors.
- Landing gear systems.
- Anti-skid braking systems.
- Master caution and warning systems.
- Auxiliary systems (including ice/rain protection, fire detection, environmental control and pressurisation, waste and water, equipment and furnishings).

It is crucial that inspection procedures, requirements for cleanliness and safety precautions relevant to the maintained system are fully perceived, understood and complied with.

It is essential to be able to interpret inspection procedures and specifications (allowable limits) and apply them in practice (including the timely involvement of supervisors or other trades).

Transferability Evidence of skills and knowledge relevant to inspection is important This is to be demonstrated through application across a range of aircraft electrical systems, components and hardware as specified in the Assessment Conditions.

**(b) Knowledge Evidence**

Evidence required to express competency in this unit must be related to and fulfil all of the requirements of the elements and performance criteria and include knowledge of:

- Component attachment methods and connection of hardware.
- Explaining the basic layout (block diagram level) and operation of:
- AC and DC power generation systems, including regulation, distribution, control and cooling.
- Battery installations and inverters.
- Flight control and/or electro-hydraulic systems.
- Engine ignition, starting, fuel distribution and control systems.
- Internal/external lighting systems, including controls.
- Doors.
- Landing gear systems.
- Anti-skid braking systems.
- Master caution and warning systems.
- Auxiliary systems (including ice/rain protection, fire detection, environmental control and pressurisation, waste and water, equipment and furnishings).
- WHS requirements applicable to the maintenance of aircraft electrical systems, including gas turbine engine high-energy ignition units.
- Electrical system maintenance requirements.
- Relevant maintenance manuals.
- Relevant regulatory requirements and standard procedures.

**(c) Assessment recommendation**

N/A

**15. ขอบเขต (Range Statement)**

**(a) Recommendation**

Different working environments and conditions that may affect performance are admissible in this field. Crucial operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

**(b) Description**

Electrical systems and components include:

- Alternating current (AC) and/or direct current (DC).
- power generation, regulation and distribution systems.
- Battery installations and bus ties/interlocks.
- Rotary and static inverters and transformer rectifier (TR).
- Units.
- Air cycle air conditioning and pressurisation systems.
- Flight and engine control systems.
- Ignition and starting systems.
- Fire/smoke detection and extinguishing.
- Lighting.
- Master and caution warning systems.
- Equipment and furnishing.
- Equipment cooling and ventilation.
- Position indicating systems.
- Fuel storage and distribution.
- Propeller control systems (where applicable to the enterprise).
- Landing gear indication and. anti-skid (where applicable to the enterprise).
- Ice and rain protection (where applicable to the enterprise).
- Wastewater (where applicable to the enterprise).

Procedures and requirements include:

- Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise.

**16. หน่วยสมรรถนะร่วม (ถ้ามี)**

N/A

**17. อุตสาหกรรมร่วม/กลุ่มอาชีพร่วม (ถ้ามี)**

N/A

**18. รายละเอียดกระบวนการและวิธีการประเมิน (Assessment Description and Procedure)**

- The assessment are based on combination of paper exams, interviewing, and practical demonstrations depending on the assessors' judgement.
- Competency should be assessed in the workplace or simulated workplace using tools and equipment stated in the maintenance manuals. It is also expected that applicable general and special purpose tools, and test and ground support equipment would be used where appropriate.
- A person cannot be assessed as competent until it can be demonstrated to the satisfaction of the workplace assessor that the relevant elements and performance criteria of the unit of competency are being achieved under routine supervision on a system and related components in the following groups:
- AC and/or DC power generation, regulation and distribution systems.
- Battery installations and bus ties/interlocks.
- Rotary and static inverters and TR units.
- Air cycle air conditioning and pressurisation systems.
- Flight and engine control systems.
- Ignition and starting systems.
- Fire/smoke detection and extinguishing.
- Lighting.
- Master and caution warning systems.
- Equipment and furnishing.
- Equipment cooling and ventilation.
- Position indicating systems.
- Fuel storage and distribution.
- Propeller control systems (may be omitted if not applicable to the enterprise).
- Landing gear indication and antiskid (may be omitted if not applicable to the enterprise).
- Ice and rain protection (may be omitted if not applicable to the enterprise).
- Wastewater (may be omitted if not applicable to the enterprise).

This shall be proven via the records in the Log of Industrial Experience and Achievement or, where appropriate, an equivalent Industry Evidence Guide.