



Australian Government

MEA339 Inspect, repair and maintain aircraft structures

Release: 1

MEA339 Inspect, repair and maintain aircraft structures

Modification History

Release 1 - New unit of competency

Application

This unit of competency requires application of procedures and techniques associated with the inspection and maintenance of aircraft structures, and with the performance of a limited range of metal and composite repairs during scheduled or unscheduled maintenance, including special inspections required after events, such as heavy landings, overstress or flight through heavy turbulence. Applications include the individual or team-related performance of structural maintenance activities on fixed or rotary wing aircraft on the flight line or in the hangar.

The unit is part of the Mechanical Certificate IV (Aircraft Maintenance Stream) training pathway.

The unit is used in workplaces that operate under the airworthiness regulatory systems of the Australian Defence Force (ADF) and the Civil Aviation Safety Authority (CASA).

Where a CASA licensing outcome is sought this unit forms part of the CASA requirement for the granting of the chosen maintenance certification licence under Civil Aviation Safety Regulation (CASR) Part 66, in accordance with the licensing provisions in the Companion Volume Implementation Guide.

Pre-requisite Unit

MEA304 Remove and install non-pressurised aircraft structural and non-structural components

OR

MEA317 Remove and install pressurised aircraft structural and non-structural components

Competency Field

Aviation maintenance

Unit Sector

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

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|----|--|-----|---|
| 1. | Inspect aircraft structure | 1.1 | Relevant maintenance documentation is used to identify specific inspection requirements |
| | | 1.2 | Appropriate preparation and access to the aircraft structure is undertaken to allow for proper inspection in accordance with maintenance documentation |
| | | 1.3 | Aircraft structure is visually or physically checked for signs of deformation defects or damage in accordance with maintenance documentation and approved procedures 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) |
| | | 1.4 | Damage or defects are assessed against damage or wear limits specified by structural repair manual or other approved data to determine if repair or replacement is required |
| | | 1.5 | Maintenance documentation is completed and processed in accordance with standard enterprise procedures |
| 2. | Prepare to undertake repair | 2.1 | Extent of damage is correctly assessed to assist in determining repair procedure |
| | | 2.2 | Appropriate repair scheme is identified in accordance with structural repair manual and/or approved data |
| | | 2.3 | Specialist advice is obtained in establishing an approved repair scheme where a standard repair scheme cannot be identified or damage is out of limits |
| | | 2.4 | All materials and equipment required are organised |
| 3. | Repair and maintain aircraft structure | 3.1 | Structural repairs are performed in accordance with approved repair scheme ensuring that aircraft standard practices are used and process requirements are carried out while observing all relevant WHS requirements, including the use of MSDS and items of PPE |
| | | 3.2 | Preventative maintenance techniques are employed to |

preserve the integrity of aircraft structure

- 3.3 Work area is cleaned of all waste material or contaminants
- 3.4 Required maintenance documentation is completed and processed in accordance with standard enterprise procedures

Foundation Skills

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

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.

Inspection of aircraft structure includes:

- Non-ferrous and ferrous alloys and composite (FRP) materials used in aircraft construction
- Structural fastening and attachment hardware and/or devices
- Seals and sealants
- Glass and moulded plastics
- Application of non-destructive testing (NDT) techniques
- Doors, hinges and locking mechanisms for damage/misalignment
- Inspections applicable to each of safe life, damage tolerant and fail safe structure relevant to enterprise
- Ageing aircraft inspection programs

Damage or defects include:

- Impact damage
- Fatigue cracking
- Corrosion
- Delamination of composites and bonded structures

Structural repairs include:

- Remove corrosion by chemical and mechanical methods
- Restore protective coatings
- Apply sealants and jointing compounds
- Freehand precision hole generation
- Remove and install structural hardware and fastening devices

	• Remove and replace bushes, bearings and bearing surfaces • Metal scab patch, flush, splice, lap and formed section repair • Composite external patch, scarf, stepped and bolted repairs
Specialist advice is obtained from:	• Supervisors • Specialist structures personnel
Relevant maintenance documentation includes:	• Servicing schedules • Maintenance manuals • Applicable Defence regulations and instructions
Procedures and requirements include:	• Industry standard procedures specified by manufacturers, regulatory authorities or the enterprise

Unit Mapping Information

Release 1 – equivalent to MEA339C Inspect, repair and maintain aircraft structures

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=ce216c9c-04d5-4b3b-9bcf-4e81d0950371>

Assessment Requirements for MEA339 Inspect, repair and maintain aircraft structures

Modification History

Release 1 - New unit of competency

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 all relevant WHS procedures, including the use of MSDS and selection and use of applicable items of PPE
- demonstrating appropriate cleaning procedures to enable structure inspection
- demonstrating correct inspection procedures, in particular pressurised aircraft, in accordance with aircraft and procedures manuals
- identifying damage to aircraft metallic (ferrous and non-ferrous) structures and/or components by way of impact, fatigue or the various types of corrosion
- inspecting damage and assessing composite components/structures
- identifying various aircraft metals and their basic properties
- identifying composite materials used in aircraft construction, associated safety precautions and hazards
- correctly interpreting repair scheme drawings, including third angle projection, isometric, sectional formats and hand sketches
- using appropriate hand tools and machines, including riveting equipment, drilling equipment, aligning tools and material fasteners (grip pins)
- applying correct removal, installation and repair techniques for:
 - a range of rivets (blind and solid) using hand, squeeze and pneumatic situations
 - a range of close tolerance fasteners (standard and oversize – hillocks and taper locks), including hole preparation
 - threaded devices, including internal and external thread cutting, Helicoil inserts and damaged stud replacement
 - hardware assembled by close tolerance fits using heat, cooling and force methods, including bearings, bushes and inserts
- performing a range of metal structure and composite material repair techniques, including:
 - metal scab patch, flush, splice, lap and formed section repair
 - composite external patch, scarf and stepped repairs
 - bolted repairs to composite skin
 - metal to metal and metal to composite bonding
- applying structural corrosion removal/treatment techniques
- restoring aircraft structure sealing and surface finishes.

It is essential that the procedures take into account all aircraft and personal safety precautions relating to aircraft structure.

Evidence of transferability of skills and knowledge related to inspection, testing and repair of aircraft structure is essential. This shall be demonstrated through application across a number of different aircraft components as listed in the Assessment Conditions.

Ability to interpret inspection and repair procedures and specifications and apply them in practice is critical. The application of the procedures should also clearly indicate knowledge of structural flight loads and aerodynamic requirements.

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:

- applicable WHS procedures, including the use of MSDS and PPE
- construction methods and materials used in:
 - fuselage sections
 - wing sections
 - engine nacelles and mounts
 - windows and window frames
 - doors, locks and access panels in pressurised and non-pressurised aircraft
- definition of structural terms, i.e. safe life, damage tolerant, failsafe, stress, strain, shear and cycles
- inspection requirements for metal and composite structure, including:
 - ageing aircraft inspection requirements
 - safe life structure
 - damage tolerant structure
 - fail safe structure
- potential causes of structural failure
- NDT methods and application of the various techniques
- construction methods of, and assessing common defects in, aircraft plastic transparencies
- basic constructional features of, and assessing common defects in, glass windscreens
- the various forms of structural corrosion, stating the causes and structural effects of corrosion on aircraft
- the terms associated with composite materials
- requirements for handling and storing aircraft metals and composite materials, including sealing agents, to industry standards
- means of identifying aircraft structural assembly fasteners (metal and composite) by interpretation of markings, numbering systems, size, shape and colour
- assessment of structural damage:
 - types and classes of mechanical damage
 - types of corrosion and determining the extent of damage
 - relevant documentation and manuals

- damage limits and repair schemes for metallic and non-metallic structure
- procedures for the fabrication and fitment of metal repairs:
 - scab patch
 - flush patch
 - splice
 - lap
 - formed section
- corrosion removal and passivation
- procedures for performing composite repairs:
 - external patch
 - scarf patch
 - stepped repairs
 - bolted repairs
- repair of integral fuel tanks and sealing of faying surfaces, including specific WHS and PPE requirements
- surface finishes and methods of restoration, including specific WHS and PPE requirements
- how to obtain MSDS
- relevant maintenance and structural repair manuals
- relevant regulatory requirements and standard procedures.

Assessment Conditions

- Competency should be assessed in the work environment or simulated work environment using tools and equipment specified in maintenance documentation. It is also expected that general-purpose tools and test equipment found in most routine situations would be used where appropriate.
- The following conditions of assessment represent the requirements of the Regulators (ADF and CASA) and maintenance stakeholders and must be rigorously observed.
- 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 across the variables in the Range of Conditions as follows:
 - inspection and/or testing of at least one (1) item from each of:
 - non-ferrous and ferrous alloys and composite (FRP) materials used in aircraft construction
 - structural fastening and attachment hardware and/or devices
 - seals and sealants
 - glass and moulded plastics
 - application of NDT techniques
 - doors, hinges and locking mechanisms for damage/misalignment
 - inspections applicable to each of safe life, damage tolerant and fail safe structure relevant to enterprise

- ageing aircraft inspection programs
- recognition of each type of damage:
 - impact damage
 - fatigue cracking
 - corrosion
- delamination of composites and bonded structures
- one (1) repair task from each of the following groups:
 - remove corrosion by chemical and mechanical methods
 - restore protective coatings
 - apply sealants and jointing compounds
 - freehand precision hole generation
 - remove and install structural hardware and fastening devices
 - remove and replace bushes, bearings and bearing surfaces
 - metal scab patch, flush, splice, lap and formed section repair
 - composite external patch, scarf and stepped repairs.
- This shall be established via the records in the Log of Industrial Experience and Achievement or, where applicable, an equivalent industry evidence guide (for details refer to the Companion Volume Assessment Guidelines).
- Assessors must satisfy the requirements of the National Vocational Education and Training Regulator (Australian Skills Quality Authority, or its successors).
- Where the unit is to be used for CASA licensing purposes the Assessor must also meet the criteria specified in the CASR Part 147 Manual of Standards.
- Individuals being assessed who have already attained MEA369 Inspect and maintain structures and related components of non-pressurised small aircraft, MEA370 Repair the structure of non-pressurised small aircraft and MEA371 Perform major repairs and modifications to small aircraft metal structure will have met the requirements of the Performance Criteria and Range of Conditions variables for Elements 1 to 3 for common variables.
- Those who have attained MEA410 Maintain aircraft structure/components will have met the Performance Criteria and Range of Conditions variables requirements for Element 1.
- The Log of Industrial Experience and Achievement records relating to the units listed above may be accepted as also meeting the evidence requirements for this unit in the applicable areas.

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