



Australian Government

MEAENG0003 Select and test aviation engineering materials

Release: 1

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Modification History

Release 1. New unit of competency. Supersedes and is not equivalent to MEA707 Select and test aeronautical engineering materials and MEA708 Select and test avionic engineering materials.

Application

This unit describes the skills and knowledge required to select aeronautical engineering materials and materials tests, source materials data, ensure appropriate performance and physical standards for mechanical or avionic applications, document materials tests, ensure calibration standards and interpret and document materials data sheets for mass production, batch production, jobbing shop and prototyping applications.

This unit applies to design and development or aeronautical engineering support team workers selecting and testing mechanical or avionic engineering materials according to established procedures, industry standards and regulatory requirements.

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

Where a CASA or DASA licensing outcome is sought this unit forms part of the requirement for the granting of the chosen maintenance certification licence under the relevant Aviation Safety Regulations, in accordance with the licensing provisions in the MEA Aeroskills Companion Volume Implementation Guide.

Any other relevant legislation, industry standards and codes of practice within Australia must be applied.

Pre-requisite Unit

Nil

Competency Field

Engineering science

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1. Identify classes of materials, based on properties and materials	1.1 Identify classes of materials, based on properties, required for engineering applications

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
tests relevant to engineering	1.2 Relate material properties to common production and construction methods and processes 1.3 Identify common characteristics, faults and flaws in materials and components or product in engineering applications 1.4 Identify test methods for materials and components or product in engineering applications 1.5 Identify specific industrial test standards or codes, calibration requirements, regulations and authorities related to selection of materials and products for engineering applications 1.6 Investigate the role of Australia's national measurement system in engineering applications
2. Identify and use sources of information on engineering materials, materials tests and test equipment	2.1 Identify and use appropriate sources of information on materials 2.2 Identify and use appropriate sources of information on methods of testing of properties of materials to ensure suitability for application 2.3 Identify and use appropriate sources of information on materials, materials tests, test calibration, and test certificates 2.4 Investigate and report on the use of standards and codes 2.5 Identify and use appropriate sources of information on material safety data sheets (MSDSs)
3. Specify and implement materials for engineering applications	3.1 Select materials for use in engineering applications based on relevant test information 3.2 Incorporate materials and components into processes in accordance with design functional requirements
4. Specify and implement methods used to test or obtain the properties of engineering materials	4.1 Specify and implement tests of materials to ensure quality, safety or suitability for applications 4.2 Check traceability of measurement standard requirements 4.3 Obtain test sheets or certificates for appropriate materials for applications in accordance with organisational procedures and/or codes and regulations 4.4 Obtain appropriate MSDS for applications in accordance with organisational procedures and/or codes and regulations
5. Report on and record materials design data and methods and results	5.1 Report and record materials selections against design functional requirements in accordance with organisational procedures, codes and regulations, including environmental impact and sustainability

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
of materials tests	assessment 5.2 Report and record materials tests and test sheets or certificates in accordance with organisational procedures, codes and regulations 5.3 Ensure calibration and traceability requirements are appropriate 5.4 Report and record appropriate MSDS for applications in accordance with organisational procedures, codes and regulations

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

- Reading and writing skills to source and read information and complete material selection and testing documentation.
- Numeracy skills to interpret measurement requirements and data.

Other foundation skills essential to performance are explicit in the performance criteria of this unit.

Unit Mapping Information

Release 1. Supersedes and is not equivalent to MEA707 Select and test aeronautical engineering materials and MEA708 Select and test avionic engineering materials.

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 MEAENG0003 Select and test aviation engineering materials

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Performance Evidence

There must be evidence the candidate has completed all the tasks outlined in the elements and performance criteria of this unit, and demonstrated the ability to conduct at least two tests on two or more aeronautical engineering materials from the following material groups:

- non-ferrous metals and alloys
- ferrous metals
- non-metallic
- electrical insulation.

Knowledge Evidence

There must be evidence the candidate has knowledge of:

- regulatory bodies and industrial authorities, including:
 - Australian Standards (AS)
 - American Society of Testing and Materials (ASTM)
 - US Military Specification (MIL Spec.)
 - American Society of Manufacturing Engineers (ASME)
 - International Standards Organisation (ISO)
 - Civil Aviation Safety Authority (CASA)
 - Australian Defence Force (ADF)
 - United States Federal Aviation Authority
 - European Aviation Safety Agency
- codes, standards, legislation and regulations related to selection of materials and products for engineering applications, including environmental impact and sustainability assessment
- materials, components and products, including characteristics, faults and flaws
- classes of materials, including:
 - non-ferrous metals and alloys – copper, aluminium, zinc, lead, tin, titanium and their alloys
 - ferrous metals – carbon steels, alloy steels and cast irons
 - non-metallic – composite materials, bearing materials, lubricants, ceramics, polymers and fabrics, adhesives

- electrical insulation materials, thermal conductors and insulators, electrical conductors, semiconductors and insulators
- properties of materials, including:
 - strength
 - elasticity and plasticity
 - malleability
 - toughness and brittleness
 - fatigue endurance
 - mouldability, weldability, machinability and formability
 - resistance to creep and stress relaxation
 - resistance to degradation (e.g. use of plastic fillers to enhance UV resistance)
 - adhesion
 - electrical, magnetic, thermal, chemical and optical
 - material structure and effect on properties
 - flammability of fabrics
- effect of the following on engineering materials:
 - manufacturing and construction processes on material properties (e.g. effect of heat treatment on corrosion resistance and fatigue properties, hydrogen embrittlement, shot peening of surfaces)
 - material characteristics, faults and flaws on product and processes
 - corrosion and corrosion protection methods
 - aging of metals and fatigue
 - property enhancement on design (e.g. adhesives plus sintering replacing some forging and machining of gears on shafts)
 - lay-up methods for composite structures
 - costs, such as manufacture of material, source of material, and typical applications and possibilities
- organisational procedures, including:
 - calibration procedures
 - traceability requirements
 - reporting and record keeping
 - testing including typical applications for tests
 - material safety data sheets (MSDSs)
- test methods, standards and regulations for:
 - materials and components
 - faults and flaws in materials and components or product
- sources and uses of information on materials, materials tests, test certificates, regulations, standards, including:
 - reference texts
 - manufacturer's catalogues and industrial magazines
 - websites

- use of phone, email and fax information gathering
- methods of accessing and using alternative information sources
- identification of materials for an application based on comparison of properties of materials
- Australia's national measurement system and its role and governing bodies, including:
 - National Measurement Institute (NMI)
 - National Association of Testing Authorities
 - Standards Australia
 - Joint Accreditation System of Australia and New Zealand
- measurement standard requirements
- common production and construction methods and processes
- design functional requirements.

Assessment Conditions

The following conditions of assessment represent the requirements of the regulators (DASA and CASA) and maintenance stakeholders and must be rigorously observed.

Skills must have been demonstrated in the workplace or in a simulated environment that reflects workplace conditions and contingencies encountered in selecting and testing aviation engineering materials. The following conditions must be met for this unit:

- use of suitable facilities, equipment and resources, including workplace procedures, manufacturing specifications, codes, standards, manuals, and reference materials relevant to selecting and testing engineering materials.

Evidence of tasks demonstrating competency must be recorded in a log of industrial experience and achievement.

Assessors must satisfy the NVR/AQTF mandatory competency requirements for assessors.

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