



Australian Government

Assessment Requirements for MEM48030 Apply materials selection analysis techniques

Release: 1

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Modification History

Release 1. New unit.

Performance Evidence

There must be evidence the candidate has demonstrated the ability to:

- review design information for material specifications and requirements
- search and use online and hard copy materials reference information including manufacturer and/or supplier specifications and test data
- prepare a report that lists candidate materials and constraints and justifies materials selection for three designs that collectively include the following material types:
 - polymer
 - metal
 - composite
 - ceramic
- specify appropriate tests for at least one metallic and one non-metallic common engineering material and review test results.

Note: Where a volume and/or frequency is not specified, demonstration must be provided at least once.

Knowledge Evidence

There must be evidence the candidate has knowledge of:

- taxonomy for classification of materials including families, classes, sub-classes and members
- families and classes of materials common in manufacturing including:
 - metals
 - ferrous
 - nonferrous
 - polymers including:
 - thermoplastics
 - thermosets
 - elastomers
 - ceramics including:
 - glasses
 - high strength (technical) ceramics
 - low strength (non-technical) ceramics

- composites and hybrids
- basic physical and chemical material science concepts relevant to material selection including:
 - intermolecular forces and relationship to material properties
 - periodic table
 - chemical equilibrium
 - phase transitions
 - laws of thermodynamics and relationship to chemical processes
- sources of material documentation, test data and allowable limits
- physical properties of materials including concept, definition and units of measurement for:
 - electrical conductivity/resistivity
 - specific gravity/density
 - thermal conductivity/expansion
 - specific heat
 - melting/boiling points
 - glass transition
 - maximum and minimum service temperature
- definitions and units of measurement for mechanical properties of materials including:
 - strength
 - yield
 - tensile
 - compressive
 - shear characteristics
 - torsion
 - hardness
 - impact resistance
 - fatigue resistance
 - elasticity
 - plasticity
 - ductility
 - malleability
 - creep resistance
 - visual appearance and colour
 - corrosion resistance
 - wear rate
- magnetic properties
- electrical resistance
- chemical processes important to material selection including:
 - corrosion of metals

- polymer degradation
- materials testing methods and applications including
 - destructive tests
 - non-destructive tests
- material attributes that affect processing and use including:
 - cost
 - availability
 - aesthetic attributes
 - colour
 - texture
 - transparency
 - processing characteristics
 - required energy
 - temperature
 - pressure
 - safety
 - time
 - efficiency – final material vs waste
 - equipment
 - required skill
 - environmental properties
 - embodied energy – definition, symbol and units
 - carbon footprint – definition, symbol and units.
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Assessment Conditions

- Assessors must:
 - have vocational competency in applying materials selection analysis techniques at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015 or its replacement* and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring State as the case requires.
- Where possible, assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions that cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.
- There must be suitable access to an operating plant or equipment that allows for appropriate and realistic simulation and documentation including relevant workplace procedures, industry codes and standards.

- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
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Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>