



**Australian Government**

# **Assessment Requirements for MEM24012 Apply metallurgical principles**

**Release: 1**

# Assessment Requirements for MEM24012 Apply metallurgical principles

## Modification History

Release 1. Supersedes and is equivalent to MEM24012C Apply metallurgy principles.

## Performance Evidence

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

- following work instructions, standard operating procedures (SOPs) and safe work practices
- researching and applying metallurgical principles associated with selecting non-destructive testing (NDT) appropriate to metal or alloy and manufacturing process
- interpreting and applying principles and methods for fusion welding of metals and alloys in weldments on at least two occasions
- identifying defects in weldments
- identifying defects in metal and alloy castings
- interpreting and applying principles and methods used to produce steel forging on at least two occasions
- interpreting and applying principles of mechanical testing on at least two occasions
- identifying and classifying all defects from NDT test results on at least two occasions.

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

## Knowledge Evidence

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

- safe work practices and procedures
- principles of solidification and crystal structures in metal including:
  - classification of materials
  - structure of atoms
  - process of solidification and defects formed during solidification
  - crystal structures and modification of crystal structure
  - heat treatment processes and defects formed during heat treatment
- meaning of equilibrium diagrams representative of metals including aluminium, iron, steel and common nonferrous alloys including:
  - alloy systems
  - solid and liquid solubility
  - basic equilibrium diagrams for common alloys

- principles of fusion welding in relation to NDT testing
- defects in fusion welding including:
  - processing and service defects
  - grinding
  - pickling
  - heat treatment
  - fatigue
  - corrosion and stress corrosion cracks
- principles of the formation of castings
- defects in castings
- principles of steel forging
- defects in steel forging
- principles and methods for fusion welding of metals and alloys including:
  - manual metal arc welding (MMAW)
  - submerged arc welding (SAW)
  - gas metal arc welding (GMAW)
  - gas tungsten arc welding (GTAW)
  - flux core arc welding (FCAW)
- defects in weldments including:
  - cracks
  - lack of fusion
  - cavities
  - imperfect shape
  - solid inclusions
- defects in metal and alloy casting including:
  - shrinkage cavities
  - hot tears
  - cold cracks
  - gas holes
- principles and methods used to produce steel forgings including:
  - deformations
  - strengthening mechanisms
  - annealing
- principles of mechanical testing including:
  - impact
  - tensile
  - hardness testing.

## Assessment Conditions

- Assessors must:

- have vocational competency in applying metallurgical principles 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/territory 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.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required including relevant workplace procedures, product and manufacturing specifications.
- 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.

## Links

Companion Volume implementation guides are found in VETNet -

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