



**Australian Government**

**Assessment Requirements for MEM48021  
Apply metallurgical principles and  
techniques in welding and other thermal  
processes**

# **Assessment Requirements for MEM48021 Apply metallurgical principles and techniques in welding and other thermal processes**

## **Modification History**

Release 1. Supersedes and is equivalent to MSATCM510A Apply metallurgical principles and techniques in welding and other thermal processes.

## **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
- undertaking consultations with relevant personnel and researching other sources of information including industry codes and standards in applying metallurgical principles and techniques to welding and other thermal practices appropriate to the application
- selecting appropriate scientific principles to suit specific welding applications on at least two occasions
- selecting appropriate basic mechanical techniques and associated technologies, software and hardware to suit required applications in welding
- applying and manipulating appropriate formulas for applications involving engineering calculations
- applying appropriate calculations to engineering situations
- referring solutions to the original aim of the welding application
- quoting solutions in appropriate units using appropriate significant figures
- quoting limitations of solutions due to assumptions, scientific principles and techniques used
- reporting test results and presenting and recommending welding or thermal process solution.

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
- sources of information
- welding principles and processes including:
  - mechanical
  - electrical chemical
  - metallurgical processes associated with welding

- limitations of scientific principles associated with welding
- weld defect description including for C-Mn and low alloy steels
- shape defects
- lack of fusion and penetration
- inclusions
- gas porosity
- solidification porosity
- solidification cracking
- hydrogen heat-affected zone cracking
- reheat cracking
- weldability of aluminium and its alloys
- hot cracking
- heat affected zone cracking
- welding age-hardened alloys
- welding work-hardened alloys
- weldability of carbon and low steels and the welding zones of steel
- hot cracking including carbon-manganese and sulphur ratio
- cold cracking
- calculation of carbon equivalents
- hydrogen content of steel welds and its control
- residual stress avoidance and removal
- calculation of weld pre-heat temperatures
- tests for cold crack susceptibility
- weldability of stainless steels and stainless-steel types
- thermal and electrical conductivity
- thermal expansion
- Schaeffler and DeLong diagrams to predict structures
- austenitic stainless steels
- other special grades
- weldability of cast irons
- special techniques
- weldability of the nickel alloys
- filler metals and braze welding
- other thermal processes including:
  - cutting
  - gouging
  - shaping.
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## Assessment Conditions

- Assessors must:

- have vocational competency in applying metallurgical principles and techniques in welding and other thermal processes 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.
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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>