



Australian Government

MEM05027 Perform aluminothermic welding

Release: 1

MEM05027 Perform aluminothermic welding

Modification History

Release 1. Supersedes and is equivalent to MEM05027A Perform aluminothermic welding

Application

This unit of competency defines the skills and knowledge required to weld using the aluminothermic welding process. It includes planning and preparing the welding method, preparing materials and the site for aluminothermic welding, carrying out the welding process in accordance with safe working/regulatory requirements and workplace procedures, checking weld conformance and completing all required documentation.

This unit applies in a maintenance or site environment where the weld quality is not required to meet an Australian Standard. The aluminothermic welding process (commonly referred to as the CADWELD process) is pre-engineered and is used to make welded connections of copper to copper or copper to steel or other metals. It is also used for header cable taps, conductor splices and terminations, and ground rod connections, or for attaching cathodic protection leads to pipes (steel or cast iron), tanks and structures in which no outside source of heat or power is required. A common use is to join copper cables (wire) for use in direct burial (grounding/earthing) applications.

Where the interpretation of technical drawings is required unit MEM09002 Interpret technical drawing should also be selected.

Where the selection and use of engineering measurement is required unit MEM12023 Perform engineering measurements should also be selected.

Where the selection and use of tools is required unit MEM18001 Use hand tools and unit MEM18002 Use power tools/hand held operations, should also be selected as appropriate.

Work may be undertaken in the field/on-site (as distinct from a production/manufacturing facility) and may be undertaken in a trench. In those situations, MSMOPS363 Organise on-site work, for work on site and MSMPER205 Enter confined space, for work in a trench should also be selected as appropriate. Work will often be undertaken under a permit to work system in which case MSMPER200 Work in accordance with an issued permit and possibly other related permit units should also be selected as appropriate.

Where the aluminothermic welding process is required for rail track welding, TLIW3015 Weld rail using aluminothermic welding process should be selected from the TLI Transport and Logistics Training Package.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Band: A

Unit Weight: 2

Pre-requisite Unit

MEM11011	Undertake manual handling
MEM13015	Work safely and effectively in manufacturing and engineering
MEM16006	Organise and communicate information

Competency Field

Fabrication

Elements and Performance Criteria

Elements describe the essential outcomes.

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

1	Determine job requirements	1.1	Follow standard operating procedures (SOPs)
		1.2	Comply with work health and safety (WHS) requirements at all times
		1.3	Use appropriate personal protective equipment (PPE) in accordance with SOPs
		1.4	Identify job requirements from specifications, sketches, job sheets or work instructions
2	Prepare and plan for welding	2.1	Identify weld requirements from job instructions
		2.2	Obtain permits and other required authorities
		2.3	Identify site and job hazards and implement appropriate hazard control measures
		2.4	Complete pre-site preparations
		2.5	Identify the locations of welds and assess in accordance with SOPs and specifications
		2.6	Clean and prepare surfaces ready for welding
		2.7	Clear site of obstructions and combustible material to minimise risk of accidents and fire

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

3	Prepare equipment for welding	3.1	Set up welding equipment
		3.2	Select consumables to suit application
4	Perform aluminothermic welding	4.1	Apply safe welding practices
		4.2	Ensure moulds are fitted and shimmed, sleeved or sealed, as required
		4.3	Pre-heat materials to standard
		4.4	Ensure materials are welded using aluminothermic method in accordance with approved procedures
		4.5	Clean welds
		4.6	Clean and inspect mould
5	Complete documentation	5.1	Assess weld conformance in accordance with specifications
		5.2	Complete required reports, documentation and/or records in accordance with workplace requirements

Foundation Skills

This section describes those required skills (reading, writing, oral communication and numeracy) that are essential to workplace performance in this unit of competency.

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.

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Work environment includes one (1) or more of the following:

- restricted spaces
- exposed conditions
- controlled or open environments

Pre-site preparations include one (1) or more of the following:

- checking all required equipment and materials
- identifying required personal protective equipment
- loading all requirements for the job

Materials to be joined include one (1) or more of the following:

- common steel
- copper-clad steel
- Columbium
- Niobium
- brass
- wrought iron
- stainless steel
- cast iron
- galvanised and bethanised steel
- bronze
- silicon bronze

Assessment of weld locations include one (1) or more of the following:

- proximity to existing welds or repairs
- substrate integrity issues
- preparation of pre-qualification samples

Weld consumables include one (1) or more of the following:

- aluminothermic powder
- starting powder
- metallic disc

Equipment includes one (1) or more of the following:

- mould
- lute (sealant)
- ignition source
- handle clamps
- wire brush
- mould scraper

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- gas pre-heating/cutting equipment

PPE includes one or more of the following:

- high visibility clothing
- fire retardant overalls or long sleeved shirts and long pants
- hearing protection
- gauntlet type gloves
- welding goggles
- safety glasses
- safety headwear
- safety footwear
- portable radios/mobile phones
- other safety devices

Procedures and codes include one (1) or more of the following:

- relevant state/territory WHS legislation together with any nationally approved compliance codes and/or guidelines
- relevant state/territory environmental protection requirements
- legislation
- relevant fire regulations

Unit Mapping Information

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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>

Assessment Requirements for MEM05027 Perform aluminothermic welding

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria on at least two (2) occasions and include:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- identifying and interpreting specifications from sketches, sketches and verbal or written job instructions for aluminothermic welding, including location of welds
- preparing site for welding by obtaining appropriate permits, identifying site/job hazards and implementing hazard control measures and assessing weld location
- selecting and setting up welding equipment and consumables
- welding materials consistently to specification
- cleaning and inspecting welds for conformance in accordance with SOPs and completing records.

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 welding practices and procedures and use of personal protective equipment (PPE)
- relevant safety, work health and safety (WHS) and environmental procedures and regulations
- principles of the aluminothermic welding process chemical reaction
- common types of welding imperfections and defects and their causes (e.g. cracks, porosities, mould off centre, stresses in materials, pre-heating offset, sand inclusions and moisture)
- workplace procedures for the welding of materials using the aluminothermic technique
- problems that can occur during the welding of materials using the aluminothermic technique and action that can be taken to report or resolve the problems
- contents of relevant technical manuals and instructions
- characteristics of plant and equipment, hardware and components used in welding activities
- impact on work activities of regulatory requirements
- impact of other work activities on welding integrity
- workplace documentation requirements

- site inspection techniques.

Assessment Conditions

- Assessors must:
 - have vocational competency in performing aluminothermic welding 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. This must 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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