Australian Government

# MEM05017D Weld using gas metal arc welding process

**Release: 1**

INDUSTRY SKILLS COUNCILS
Creating Australia's Future

# MEM05017D Weld using gas metal arc welding process

## Modification History

Not Applicable


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# Unit Descriptor

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| **Unit descriptor** | This unit of competency covers the preparation, positioning, fixing, and manual welding techniques associated with general trade level welding using gas metal arc welding (GMAW) equipment including the selection and set up of the equipment appropriate to both the material and the weld to be performed, carrying out the GMAW to prescribed standards, and examining for and correcting defects, in a range of welded fabrications. |

# Application of the Unit

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| **Application of the unit** | This unit of competency applies to welds associated with heavy or light metal fabrications. Welds are fillet and butt welds in all positions on a range of ferrous and non-ferrous materials that may include carbon steel or stainless steel. Weld quality would conform to Australian Standard 1554 General Purpose, American Bureau of Shipping (ABS) or equivalent.<br><br>This unit has been primarily developed for Engineering Tradesperson - Fabrication apprenticeship training and the recognition of trade level skills in GMAW. It may also apply to other trade occupations requiring higher level GMAW welding skills.<br><br>Where manual thermal processes associated with preparation, pre-heat and/or post-heat are required, MEM05007C Perform manual heating and thermal cutting and/or MEM05008C Perform advanced manual thermal cutting, gouging and shaping should be considered for selection.<br><br>**Band**: **A**<br><br>**Unit Weight**: **4** |

# Licensing/Regulatory Information

Not Applicable


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# Pre-Requisites

| **Prerequisite units** | | |
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| **Path 1** | MEM05050B | Perform routine gas metal arc welding |
| | MEM05051A | Select welding processes |
| | MEM05052A | Apply safe welding practices |
| | MEM12023A | Perform engineering measurements |
| | MEM18001C | Use hand tools |
| | MEM18002B | Use power tools/hand held operations |

# Employability Skills Information

| **Employability skills** | This unit contains employability skills. |
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# Elements and Performance Criteria Pre-Content

| Elements describe the essential outcomes of a unit of competency. | Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide. |
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# Elements and Performance Criteria

| ELEMENT | PERFORMANCE CRITERIA |
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| 1. Prepare materials for gas metal arc welding (GMAW) | 1.1. Weld requirements are identified from specifications and/or drawings<br>1.2. Material is correctly prepared<br>1.3. Materials are assembled/aligned to specification where required |
| 2. Select welding components and consumables | 2.1. Welding machine settings, accessories and consumables are identified and selected |
| 3. Assemble and set up welding equipment | 3.1. Welding equipment is assembled and set up |
| 4. Minimise and rectify distortion | 4.1. Appropriate distortion prevention measures are selected and applied<br>4.2. Distortion is rectified |
| 5. Weld to job specification using GMAW | 5.1. Weld deposit is to specifications<br>5.2. Joints are cleaned to specifications |
| 6. Ensure weld conformance | 6.1. Weld joints are visually inspected for conformance to specifications<br>6.2. Defects are removed with minimum loss of sound metal using correct and appropriate techniques and tools |
| 7. Maintain weld records as required | 7.1. Weld records are completed correctly |

# Required Skills and Knowledge

| REQUIRED SKILLS AND KNOWLEDGE |
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| This section describes the skills and knowledge required for this unit. |
| **Required skills** |
| Required skills include:<br>• identifying and interpreting welding specifications including appropriate standards e.g. Australian Standard 1554 General Purpose, American Bureau of Shipping (ABS) or equivalent<br>• selecting and using appropriate tools and equipment |


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| REQUIRED SKILLS AND KNOWLEDGE |
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| • using a variety of welding machines and electrodes<br>• identifying and rectifying weld defects<br>• applying techniques for distortion prevention and rectification<br>• cleaning welds<br>• reading and interpreting information on sketches, written job instructions, specifications, standard operating procedures and engineering drawings<br>• recording routine information including routine weld records related to GMAW onto proformas and standard workplace forms<br>• following oral instructions<br>• measurement skills relating to joint preparation and GMAW |
| **Required knowledge** |
| Required knowledge includes:<br>• types of gases and their uses<br>• the relationships between amperage/wire feed, voltage, gas flow, electrode and material<br>• the application of weld metal transfer (short arc, spray etc.)<br>• correct welding machine, leads, hand pieces and electrodes<br>• material preparation<br>• joint preparations<br>• electrode classification<br>• causes of distortion for materials within the scope of this unit<br>• safe welding practices<br>• use and application of personal protective equipment for GMAW |


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# Evidence Guide

| EVIDENCE GUIDE | |
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| The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package. | |
| **Overview of assessment** | A person who demonstrates competency in this unit must be able to prepare materials, select and set up the welding equipment, carry out GMAW and examine for and correct defects, in a range of welding activities associated with GMAW. Competency in this unit cannot be awarded until all prerequisites have been satisfied. |
| **Critical aspects for assessment and evidence required to demonstrate competency in this unit** | Assessors must be satisfied that the candidate can competently and consistently apply the skills covered in this unit of competency in new and different workplace situations and contexts. Critical aspects of assessment and evidence include:<br>• following all safety procedures to protect self, other workers and members of the public<br>• identifying and interpreting specifications for GMAW including Australian Standard 1554 General Purpose<br>• interpreting welding specifications including standard welding symbols used to show weld procedure<br>• selecting appropriate weld preparation methods for material and position of welds.<br>• preparing materials, setting up of jigs, fixtures, clamps,etc. and joint preparation including bevelling<br>• consistently welding different ferrous and non-ferrous materials to AS 1554 General Purpose or equivalent<br>• identifying defects as described in the range statement across a range of welded materials<br>• rectifying defects. |
| **Context of and specific resources for assessment** | Welding to AS 1554 General Purpose or equivalent requires both theoretical knowledge and high level practical skills. The assessment process must be designed to identify consistent performance to the standard and the specifications across a range of materials and positions. The assessment must also identify a level of workplace performance in terms of defect rates and weld failure rates. It is recommended that assessment involve demonstrations of competency under both workshop and |


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| EVIDENCE GUIDE | |
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| | site conditions. This means that the ideal assessment environment is either on the job or a combination of both on and off the job.<br><br>The competencies covered by this unit may be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate. |
| **Method of assessment** | Typically an Engineering Tradesperson - Fabrication and other tradespersons engaged in welding are required to exercise GMAW skills and techniques across a range of jobs and specifications.<br><br>A single assessment event is not appropriate. On the job assessment should be included as part of the assessment process wherever possible. Where assessment occurs off the job, judgement must consider evidence of the candidate's performance in a productive work environment that includes a sufficient range of appropriate tasks and materials to cover the scope of application for this unit.<br><br>Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency.<br><br>The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials. |
| **Guidance information for assessment** | This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with welding using GMAW process or other units requiring the exercise of the skills and knowledge covered by this unit.<br><br>Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts. |


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# Range Statement

| RANGE STATEMENT | |
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| The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included. | |
| **Weld** | Welds include fillet and butt welds carried out in all positions |
| **Materials** | Materials may include ferrous materials including carbon or stainless steel, as well as non-ferrous metals and alloys suitable for GMAW |
| **Prepared** | Preparation of materials may include:<br>• pre-heating<br>• setting up of jigs, fixtures and clamps<br>• joint preparation (e.g. bevelling) |
| **Equipment** | Equipment may include AC or DC welding machines |
| **Distortion prevention measures** | Distortion prevention measures may include:<br>• pre-heating<br>• setting up of jigs, fixtures and clamps |
| **Rectified** | Rectified refers to oxy acetylene, air arc equipment and grinding devices |
| **Defects** | Defects may include:<br>• porosity<br>• slag inclusions<br>• discontinuities<br>• lack of penetration<br>• undercut |


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# Unit Sector(s)

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| **Unit sector** | |

# Co-requisite units

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| **Co-requisite units** | | |
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# Competency field

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| **Competency field** | Fabrication |


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