



Australian Government

MEM05066 Develop and maintain welding procedures

Release: 1

MEM05066 Develop and maintain welding procedures

Modification History

Release 1. New Unit.

Application

This unit of competency was developed for post trade engineering fabrication training and the recognition of post trade engineering fabrication skills in developing welding procedure specifications (WPS) to support welding operations undertaken to meet Australian and international welding standards and codes or where welding to a WPS is mandated as part of the work requirement.

The unit scope includes the required underpinning welding and metallurgical skills and knowledge of relevant welding standards, welding terminology and welder qualification requirements as defined in the unit in conjunction with its prerequisites.

The unit is intended to apply in occupations such as welding supervisors, welding engineers, welding inspectors and professional and technical employees that require a detailed knowledge of how WPSs are developed and maintained.

Where the conduct of non-destructive testing (NDT) is required, relevant NDT units must also be selected.

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

Band: B

Unit weight: 6

Pre-requisite Unit

MEM05061 Apply basic metallurgy principles to welding applications

MEM05078 Apply welding principles

MEM05085 Select welding processes

MEM11011 Undertake manual handling

MEM12023 Perform engineering measurements

MEM12024 Perform computations

MEM13015 Work safely and effectively in manufacturing and engineering

MEM14006 Plan work activities

MEM16006 Organise and communicate information

Plus one or more of the following units and their prerequisites:

MEM05060 Perform welds to code standards using submerged arc welding process

MEM05079 Perform welds to code standards using flux core arc welding process

MEM05080 Perform welds to code standards using gas metal arc welding process

MEM05081 Perform welds to code standards using gas tungsten arc welding process

MEM05082 Perform pipe welds to code standards using manual metal arc welding process

MEM05083 Perform welds to code standards using manual metal arc welding process

MEM05088 Perform welds to code standards using oxy fuel gas welding process

Competency Field

Fabrication

Elements and Performance Criteria

Elements	Performance Criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1. Interpret customer requirements	1.1 Identify welding and fabrication requirements from drawings, specifications and other documentation 1.2 Determine implications for required welding and testing from specified codes and standards 1.3 Identify joint design and welding parameter specifications required by WPS 1.4 Identify issues where requests for further information (RFIs) are required and communicate them to the customer 1.5 Record any resultant changes to welding, fabrication and quality specifications
2. Develop a preliminary WPS	2.1 List or produce sketches of required joints for inclusion in WPS 2.2 Develop preliminary welding procedure specification based on the design, specified standards and any customer additional requirements 2.3 Assess availability and appropriateness of pre-approved procedure qualification records (PQRs), WPSs and consumables 2.4 Determine number and type of test pieces required 2.5 Supervise welding of test pieces against preliminary WPS 2.6 Organise testing of test welds by an accredited testing agency or

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Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
	verify results of previous testing procedures, where allowed under relevant standards or codes and customer specification
3. Establish final welding procedure	3.1 Interpret destructive and non-destructive testing (NDT) reports 3.2 Document test results and the procedures for creating and testing sample welds in a PQR 3.3 Adjust preliminary WPS as necessary and document final WPS based on outcomes 3.4 Obtain approval of WPS according to requirements of relevant standards and/or codes, regulations and customer 3.5 Record WPS in accordance with enterprise standard and code requirements
4. Maintain WPS	4.1 Liaise with fabricator on use of WPS in production 4.2 Review results of testing of production test pieces and other weld tests 4.3 Adjust WPS based on review 4.4 Obtain approval of any adjustments to WPS according to requirements of relevant standards and/or codes, regulations and customer 4.5 Record adjustments to WPS according to enterprise and standard and code requirements

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

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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Standards and codes include Australian or international standards and codes covering:	• welding processes • welding consumables • materials used in fabrication related projects or products • destructive and non-destructive testing of welds • qualifying of welders, welding inspectors and welding supervisors.
Non-destructive test reports include one or more of the following:	• dye penetrant • magnetic particle • radiographic • ultrasound.
Welding procedure qualification record (PQR)	the PQR is used as the basis for developing WPS. It is usually not job specific or customer specific although different organisations may use different formats providing the required information is included. The PQR must include: • the measured parameters used in producing the test weld • all relevant destructive and NDT tests and their outcomes of those tests or a reference to other documents that record the results • details of the approval of the PQR by an appropriate person.
Welding procedure specification (WPS) format includes one or more of the following:	• electronic • paper based.
Welding procedure parameters include one or more of the following:	• material specification and grade • material preparation • joint details • position • run sequence and pass number • welding process • filler material • material diameter • current • voltage • polarity • wire feed speed where relevant • travel speed • pre and post-heat input where required.

Unit Mapping Information

No equivalent unit.

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 MEM05066 Develop and maintain welding procedures

Modification History

Release 1. New Unit.

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 the ability to:

- interpret technical drawings
- apply requirements of relevant standards and codes to designs incorporating welding and associated processes
- produce sketches showing joint configuration including weld dimensions, weld preparation, weld position or number, material type and grade for inclusion in welding procedure specification (WPS)
- assess pre-approved procedure qualification records (PQRs) and WPSs and consumables for suitability to a current design
- supervise the welding of test pieces including:
 - determining the number and type of test piece required for at least two ferrous and two non-ferrous designs and their nominated standards or codes
 - measuring and recording of welding parameters used during welding of test pieces
 - arrange for any required witnessing of welding of test pieces
- produce PQRs and WPSs covering:
 - ferrous and non-ferrous welding
 - manual metal arc welding (MMAW), gas metal arc welding (GMAW), tungsten inert gas (TIG), submerged arc, flux cored and oxy welding processes
 - welds to AS1554 Structural Purpose
 - at least one international welding standard
- file PQRs and WPSs to a welding library.

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:

- factors that influence the quality of fusion welds in steels
- the characteristics of commonly-used welding processes
- technical drawings and welding symbols
- set up for the inspection of welds, macrosections and other mechanical tests

- the effects that material departure from specification has on weld quality
- procedures for production of test pieces for welding related non-destructive tests (NDTs)
- types of welding related to NDT and their application
- arithmetic operations, formulae and calculations for testing welding and/or fabrications
- procedures for:
 - organising weld tests and obtaining previous weld tests
 - verifying/amending previously established weld test procedures
 - documenting welding procedures and preparing a weld test piece
- information to be covered in a WPS including:
 - procedure number
 - process type
 - consumable size, type and full codification
 - consumable baking requirement if applicable
 - parent material grade and specification
 - plate or pipe thickness range
 - pipe diameter range
 - welding position
 - joint fit up, preparation, cleaning, dimensions etc.
 - backing strip, back gouging information
 - pre-heat (including minimum temperature and method)
 - interpass if required and recording of maximum temperature recorded
 - post weld heat treatment if required including time and temperature
 - welding technique (weaving, max run width etc.)
 - arc energy limits and their correct application
 - welding current and polarity
 - arc voltage
 - pulse parameters
 - wire feed speed
 - wire configuration
 - welding electrode types and their use
 - welding gases for shielding, fuel and purging
 - fluxes
 - torch and nozzle types and applications.
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Assessment Conditions

- Assessors must:
 - have vocational competency in developing and maintaining welding procedures 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.
- Assessment must occur in a functioning workplace. Where assessment in the workplace would be unsafe, impractical or threatens the environment, assessment must occur in a sufficiently rigorous simulated environment that reflects the circumstances that would be experienced in a functioning workplace. Assessment must cover all aspects of workplace performance, including task skills, task management skills, contingency management skills and job role environment skills.
- Knowledge assessment may be either verbal or written but must adequately reflect the knowledge requirements of the unit in a functioning workplace.
- 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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