



Australian Government

PMBWELD301 Butt weld polyethylene plastic pipelines

Release: 1

PMBWELD301 Butt weld polyethylene plastic pipelines

Modification History

Release 1. Supersedes and is equivalent to PMBWELD301B Butt weld polyethylene plastic pipelines

Application

This unit of competency covers the skills and knowledge required to butt weld polyethylene (PE) plastic pipelines. It applies to welding undertaken in the field and in factory conditions. Pipelines may be for transmission of gas or liquids.

This unit of competency applies to experienced operators who are required to calculate appropriate welding parameters to be used, set up equipment, perform butt weld, assess joints against specifications and solve problems within area of responsibility.

This unit of competency applies to an experienced operator demonstrating theoretical and technical knowledge and well developed skills in situations that require some discretion and judgement. The operator may work alone or as a member of a team or group and will work in liaison with other shift team members, team leader and supervisor, as appropriate.

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

Pre-requisite Unit

Nil

Competency Field

Welding

Unit Sector

Not applicable

Elements and Performance Criteria

Elements describe the essential outcomes.

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

- | | | |
|---|------------|--|
| 1 Identify materials as being compatible for welding | 1.1 | Identify materials as polyethylene (PE) from specifications and work site instructions |
| | 1.2 | Identify PE materials and pipes supplied as being compatible for welding from specifications |

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|---|--|---|
| 2 | Calculate appropriate pipe welding parameters | <div>2.1 Identify welding machine type and operating data</div> <div>2.2 Identify pipe materials and dimensions</div> <div>2.3 Perform welding parameter calculations for individual welding machines and pipe details</div> <div>2.4 Prepare field operational sheets as per enterprise requirements</div> |
| 3 | Maintain and calibrate welding equipment | <div>3.1 Set up welding equipment and work area</div> <div>3.2 Ensure safety equipment is available and operational</div> <div>3.3 Identify non-conformance, report and rectify</div> <div>3.4 Check operation and calibrate where required, heating, trimming, and pressure systems</div> |
| 4 | Perform welding to required standard | <div>4.1 Assemble pipeline components in welding machine</div> <div>4.2 Clean, align and trim pipe ends</div> <div>4.3 Perform heating, welding, and cooling phases using calculated welding parameters</div> <div>4.4 Monitor and record achieved weld parameters for each joint according to enterprise requirements</div> <div>4.5 Clean up equipment when completed according to enterprise procedures</div> <div>4.6 Clean up work site, dispose of scrap materials according to enterprise procedures</div> <div>4.7 Use personal protective equipment (PPE) according to enterprise requirements</div> |
| 5 | Assess quality of completed joints | <div>5.1 Identify quality requirements for joints</div> <div>5.2 Assess joints against specification requirements, and report results</div> |

5.3 Identify and report non-conformances according to enterprise requirements

Foundation Skills

This section describes those required skills (language, literacy and numeracy) 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.

Regulatory framework The latest version of all legislation, regulations, industry codes of practice and Australian/international standards, or the version specified by the local regulatory authority, must be used.

Applicable legislation, regulations, standards and codes of practice include:

- health, safety and environmental (HSE) legislation, regulations and codes of practice relevant to the workplace, manual handling and hazardous materials
- Australian/international standards relevant to the materials being used and products being made, including one or more of:
 - AS/NZS 4130:2009 Polyethylene (PE) pipes for pressure applications, or its replacement
 - AS/NZS 4131:2010 Polyethylene (PE) compounds for pressure pipes and fittings, or its replacement
 - AS/NZS 4401:2006 Plastics piping systems for soil and waste discharge (low and high temperature) inside buildings - Polyethylene (PE), or its replacement
 - AS/NZS 5065:2005 Polyethylene and polypropylene pipes and fittings for drainage and sewerage applications, or its replacement
 - ISO 21307:2011 Plastics pipes and fittings—Butt fusion jointing procedures for polyethylene (PE) pipes and fittings used in the construction of gas and water distribution systems or its replacement
- any relevant licence and certification requirements.

All operations to which this unit applies are subject to stringent HSE requirements, which may be imposed through state/territory or federal

legislation, and these must not be compromised at any time. Where there is an apparent conflict between performance criteria and such requirements the legislative requirements take precedence.

Procedures All operations must be performed in accordance with relevant procedures.

Procedures are written, verbal, visual, computer-based or in some other form, and include one or any combination of:

- emergency procedures
- work instructions
- standard operating procedures (SOPs)
- safe work method statements (SWMS)
- formulas/recipes
- batch sheets
- temporary instructions
- any similar instructions provided for the smooth running of the plant.

Tools and equipment

Tools and equipment include:

- hydraulic activated butt welding machines
- pipe supports
- measurement devices, including one or more of:
 - pressure gauges
 - timers
 - temperature probes
 - callipers
 - computer-based pressure/temperature monitors
- cleaning equipment
- spray equipment.

Additional tools and equipment will be selected as required from:

- hand tools used in this process
- hoists/lifting equipment not requiring any special permits or licences
- manual handling, aids such as hand carts and trolleys
- relevant PPE.

Hazards Hazards must be identified and controlled. Identifying hazards requires consideration of:

- power tools, leads and power supplies
- hazardous products and materials
- cutting equipment
- sharp edges, swarf and scrap
- protrusions or obstructions
- slippery surfaces, spills or leaks
- rotational equipment or vibration
- smoke, dust, vapours or other atmospheric hazards
- high temperatures
- electricity
- gas
- gases and liquids under pressure
- structural hazards
- equipment failures
- machinery, equipment and product mass
- other hazards that might arise.

Problems Routine and non-routine problems must be resolved.

Non-routine problems must be resolved by applying operational knowledge to develop new solutions, either individually or in collaboration with relevant experts, to:

- determine problems needing action
- determine possible fault causes
- develop solutions to problems which do not have a known solution
- follow through items initiated until final resolution has occurred
- report problems outside area of responsibility to designated person.

Non-routine problems are unexpected problems or variations of previous problems and include one or more of:

- variations in quality
- emergency situations
- intermittent faults.

Operational knowledge includes one or more of:

- procedures
- training
- technical information, such as journals and engineering specifications
- remembered experience

- relevant knowledge obtained from appropriate people.

Routine problems are predictable and have known solutions and include one or more of:

- variable PE materials and pipes as supplied
- equipment malfunction or wear and tear
- variable field site conditions.

Unit Mapping Information

Release 1. Supersedes and is equivalent to PMBWELD301B Butt weld polyethylene plastic pipelines

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=932aacef-7947-4c80-acc6-593719fe4090>

Assessment Requirements for PMBWELD301 Butt weld polyethylene plastic pipelines

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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 and demonstrate the ability to:

- read and interpret designs, plans, patterns, procedures, job specifications, instruments/control panels, material labels and safety data sheets (SDS)
- plan the welding process and sequence tasks
- use mathematics to calculate welding parameters
- set up butt welding equipment and materials/components to meet specifications
- operate the equipment to weld the materials
- monitor key variables, including:
 - temperature
 - pressure
 - alignment
 - colour and uniformity
 - surface finish/appearance
 - tolerance for weld/joint
 - consistency of weld
 - product output rate
 - mechanical strength of weld (e.g. tensile strength results)
 - product integrity and general conformance to specification
- make adjustments to remedy faults and nonconformity
- maintain output and product quality using appropriate instruments, controls, test information and readings
- calibrate equipment according to procedures
- identify hazards and apply relevant hazard controls
- apply safety procedures
- apply housekeeping procedures
- apply waste management procedures
- recognise early warning signs of equipment/processes needing attention or with potential problems
- distinguish between causes of problems, including:
 - operational problems
 - instrument failure/malfunction

- electrical failure/malfunction
- mechanical failure/malfunction
- wrong readings
- equipment design deficiencies
- materials properties
- process variables
- raw material variations/contamination
- process abnormalities
- procedural errors
- recognise and prioritise problems requiring action
- resolve routine and non-routine problems
- communicate effectively with team/work group and supervisors
- complete workplace records.

Knowledge Evidence

Must provide evidence that demonstrates knowledge relevant to their job sufficient to operate independently and to solve routine and non-routine problems, including knowledge of:

- function and operating principles of butt welding equipment, components and ancillary equipment
- types and application of butt welding processes and their effect on the welded product
- impact of variations in welding process variables and raw materials on product quality and production output
- factors which may affect product quality or production output and appropriate remedies
- characteristics of materials and their behaviour in relation to welding process variables and stages of production
- quality requirements at each production stage
- common adjustments in process variables and their impact on product quality and production output
- impact of variations in raw materials and equipment operation in relation to final product
- possible changes to materials properties to better suit specific process requirements
- routine and non-routine problems that may arise, the range of possible causes and appropriate actions
- organisation procedures relevant to the work environment/job role
- hierarchy of control
- hazards that may arise in the job/work environment and:
 - their possible causes
 - potential consequences
 - appropriate risk controls.

Assessment Conditions

- The unit should be assessed holistically and the judgement of competence shall be based on a holistic assessment of the evidence.
- In all plants it may be appropriate to assess this unit concurrently with units such as:
 - teamwork
 - communication.
- Where the assessee does not currently possess evidence of competency in *PMBPROD287 Weld plastics materials*, it may be co-assessed with this unit.
- The collection of performance evidence:
 - should occur over a range of situations which include typical disruptions to normal, smooth operation of an operating plant
 - will typically include a supervisor/third-party report or other evidence, focusing on consistent performance and problem recognition and solving. A supervisor/third-party report must be prepared by someone who has a direct, relevant, current relationship with the person being assessed and who is in a position to form a judgement on workplace performance relevant to the unit of competency
 - must include the use of an appropriate industrial item of equipment requiring demonstration of operation, start and stop procedures and responding to problems
 - may use industry-based simulation for all or part of the unit particularly where safety, lack of opportunity or significant cost is an issue.
- Assessment should 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.
- Assessment in a simulated environment should use evidence collected from demonstration of skills and one or more of:
 - walk-throughs
 - pilot plant operation
 - industry-based case studies/scenarios
 - 'what ifs'.
- Knowledge evidence may be collected concurrently with performance evidence or through an independent process, such as workbooks, written assessments or interviews.
- 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.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications associated with this unit.
- The regulatory framework will be reflected in workplace policies and procedures and is not required to be independently assessed.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.

- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- In addition the assessor or anyone acting in subject matter expert role in assessment shall demonstrate both technical competency and currency. If the assessor cannot demonstrate technical competency and currency they shall assess with a subject matter expert who does meet these requirements.
- Technical competence can be demonstrated through one or more of:
 - relevant VET or other qualification/Statement of Attainment
 - appropriate workplace experience undertaking the type of work being assessed under routine and non-routine conditions
 - appropriate workplace experience supervising/evaluating the type of work being assessed under routine and non-routine conditions
- Currency can be demonstrated through one or more of:
 - being currently employed undertaking the type of work being assessed
 - being employed by the organisation undertaking the type of work being assessed and having maintained currency in accordance with that organisation's policies and procedures
 - having consulted/had contact with an organisation undertaking the type of work being assessed within the last twelve months, the consultation/contact being related to assessment
 - conducting on the job training/assessments of the type of work being assessed
 - being an active member of a relevant professional body and participating in activities relevant to the assessment of this type of work.

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