



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **PMBPROD387B Produce welded plastics materials**

**Revision Number: 1**

## **PMBPROD387B Produce welded plastics materials**

### **Modification History**

Not applicable.

## Unit Descriptor

### Unit descriptor

This competency covers the sequenced or continuous welding of plastic pipe, sheet and film materials to a required specification using specialised welding equipment and techniques, process machinery and ancillary equipment.

## Application of the Unit

### Application of this unit

This competency is typically performed by advanced operators applying knowledge of materials, product purpose and processes to the operation of welding equipment to produce product conforming to requirements. It also requires using a range of well developed skills requiring some discretion and judgement to recognise and resolve a range of problems. Welding may be undertaken to *ISO/TR 19480 Polyethylene pipes and fittings for the supply of gaseous fuels or water - Training and assessment of fusion operators* and/or Draft Australian Standard *WD00307 Qualification and certification of Plastics welding personnel* or its replacement.

This competency is typically performed by operators working either independently or as part of a work team. The key factors are the understanding of the processes used to weld plastic materials to permanently bond components of pipeline systems or fabricated products.

The operator will:

- set up welding equipment for sequence or continuous welding
- prepare materials for sequence or continuous welding
- monitor equipment operation
- make appropriate adjustments to correct materials, equipment or process variations
- solve welding equipment, material and process problems, seeking guidance where necessary or appropriate.

If welding is required for the licensed welding of pipe, then the relevant unit should be chosen from: *PMBWELD301A*, *PMBWELD302A*, *PMBWELD303A*, *PMBWELD304A*, *PMBWELD305A*, *PMBWELD306A*, *PMBWELD307A*, *PMBWELD308A*, *PMBWELD309A*, *PMBWELD310A*, *PMBWELD311A*.

## Licensing/Regulatory Information

Not applicable.

## Pre-Requisites

### Prerequisites

This unit of competency has the prerequisite of *PMBPROD287B Weld plastics materials*.

## Employability Skills Information

### Employability Skills

This unit contains employability skills.

## Elements and Performance Criteria Pre-Content

ELEMENT	PERFORMANCE CRITERIA
Elements describe the essential outcomes of a unit of competency	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.

## Elements and Performance Criteria

<b>ELEMENT</b> <b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b> Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
1. Identify required materials and equipment.	1.1 Identify work requirements from production plan 1.2 Identify quantity and quality of product required and any special requirements, including welding specifications. 1.3 Interpret plans, patterns, designs or product specifications. 1.4 Recognise hazards and steps required to ensure safety. 1.5 Plan welding operations for a sequence or continuous process to ensure work follows a logical procedure. 1.6 Examine process requirements to identify suitability of plastic materials for specified welding operations.
2. Set up welding equipment and materials for sequence or continuous operation.	2.1 Set up tools and equipment ready for production. 2.2 Locate materials, components and consumables. 2.3 Ensure safety equipment is available and fit for use. 2.4 Identify non-conformances and take required action.
3. Prepare plastic materials or components for welding in a sequence or continuous operation.	3.1 Assemble components for welding processes. 3.2 Take required action to ensure welding process is suitable for the materials being used.
4. Weld to specification.	4.1 Organise materials for sequence or continuous production. 4.2 Weld materials to specification using appropriate welding techniques and conditions.
5. Anticipate and solve problems.	5.1 Recognise a problem or a potential problem. 5.2 Determine problems needing priority action. 5.3 Refer problems outside area of responsibility to appropriate person, with possible causes. 5.4 Seek information and assistance as required to solve problems. 5.5 Solve problems within area of responsibility. 5.6 Follow through items initiated until final resolution

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
ELEMENT	Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.
	has occurred.

## Required Skills and Knowledge

This describes the essential skills and knowledge and their level required for this unit.

Application of knowledge of the materials, equipment and process sufficient to recognise material and equipment conditions which may lead to out of specification production.

Knowledge of organization procedures, quality requirements at each production stage and relevant regulatory requirements along with the ability to implement them within appropriate time constraints and work standards.

Skill to identify the range of possible causes of product faults.

Application of the knowledge of managing risks using the hierarchy of controls applied to the welding process. Application of approved hazard control and safety procedures and the use of PPE in relation to handling materials, equipment operation and cleanup.

Knowledge as a basis for solving processing and material problems including:

- characteristics of materials and behaviour in relation to heat, pressure, flow rate and time in the welding process
- different welding processes and their effect on the welded product
- selection of appropriate welding processes for a particular application
- function and operating principles of welding equipment, equipment components and ancillary equipment, including the heating and feeding mechanisms and material supporting/feeding mechanisms
- impact of weld speed, temperature, pressure on product quality and production output
- phases of the welding process and the effect of the key variables on product quality, in order to make appropriate adjustments to equipment settings.
- processing behaviour of those polymers which are welded at the workplace
- changes to materials at various stages of production
- waste management and importance of non-conforming materials
- impact of variations in raw materials and equipment operation in relation to final product.
- polymer properties and their interactions with process conditions
- relationships between polymer properties and process conditions
- changes to polymer properties to better suit process requirements
- product problems related to polymer properties
- product problems related to process conditions
- adjustments to process conditions to meet polymer and product requirements.

Competence also includes the ability to:

- plan own work, including predicting consequences and identifying improvements
- maintain output and product quality using appropriate instruments, controls, test information and readings
- identify and describe own role and role of others involved directly in the welding process
- identify factors which may affect product quality or production output and appropriate remedies
- identify when the when assistance is required to solve problems.

### Language, literacy and numeracy requirements

This unit requires the ability to read and interpret typical product specifications, job sheets and material labels as provided to operators.

Writing is required to the level of completing workplace forms.

Basic numeracy is also required to interpret specifications, make measurements and monitor and interpret process variables.

## Evidence Guide

The Evidence Guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, the range statement and the assessment guidelines for this training package.

### Overview of assessment

A holistic approach should be taken to the assessment.

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the Elements, Performance Criteria and skills and knowledge.

Where the assessee does not currently possess evidence of competency in *PMBPROD287B Weld plastics materials*, it may be co-assessed with this unit.

### Critical aspects for assessment and evidence required to demonstrate competency in this unit

It is essential that competence is demonstrated in the knowledge and skills defined in this unit. These may include the ability to:

- identify critical materials properties and welding process variables in relation to the process requirements and the end product
- make adjustments to the process as required
- identify and take appropriate action on problems and potential problems.

Weld quality must meet specification. See Draft Australian Standard *WD00307 Qualification and certification of Plastics welding personnel* or its replacement.

Consistent performance should be demonstrated. For example, look to see that:

- the process runs consistently and smoothly, with the minimum need for human intervention
- all safety procedures are always followed
- upstream and down stream communication is timely and effective.

### Assessment method and context

Assessment will occur on an industrial plastics welding equipment and will be undertaken in a work-like environment.

Competence in this unit may be assessed:

- using appropriate, industrial welding equipment requiring demonstration of start-up, operation and shutdown procedures
- in a situation allowing for the generation of evidence of the ability to recognise, anticipate and respond to problems
  - by using a suitable simulation and/or a range of case studies/scenarios
  - through a combination of these techniques.

In all cases it is expected that practical assessment will be combined with targeted questioning to assess the underpinning knowledge and theoretical assessment will be combined with appropriate practical/simulation or similar assessment. Assessors need to be aware of any cultural issues that may affect responses to questions.

Assessment processes and techniques must be culturally appropriate and appropriate to the oracy, language and literacy capacity of the assessee and the work being performed.

### **Specific resources for assessment**

This section should be read in conjunction with the Range Statement for this unit of competency. Resources required include suitable access to an operating plant or equipment that allows for appropriate and realistic simulation. A bank of case studies/scenarios and questions will also be required to the extent that they form part of the assessment method. Questioning may take place either in the workplace, or in an adjacent, quiet facility such as an office or lunchroom. No other special resources are required. Access must be provided to appropriate learning and/or assessment support when required. Where applicable, physical resources should include equipment modified for people with disabilities.

## **Range Statement**

### **RANGE STATEMENT**

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Add any 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. Where reference is made to industry codes of practice and/or Australian/international standards, the latest version must be used.

### **Context**

This competency includes the processes required to weld plastic pipe, sheet and film materials to a required specification, including continuous production operations on specialised welding equipment, and often involves the use of ancillary equipment.

Materials may be from a range of thermoplastic materials in the form of pipeline systems and component parts, sheet where used in sequenced production operations including vinyl product fabrication, and film where associated with continuous production operations. It includes the operation of hot plate (heated tool), extrusion, high frequency sound (ultrasonic), electrostatic (radio frequency) and thermal induction (heat) welding systems and production machinery designed for sequenced or continuous production operations, and all relevant ancillary equipment.

### **Procedures**

All operations are performed in accordance with procedures.

Procedures include all relevant workplace procedures, work instructions, temporary instructions and relevant industry and government codes and standards.

### **Tools and equipment**

This unit of competency includes use of equipment and tools such as:

- welding equipment and machinery
- hand tools as required
- relevant personal protective equipment.

### **Hazards**

Typical hazards include:

- fumes from overheating or poor ventilation
- cuts from sharp edges on components

- burns from manual handling
- eye injury
- welding equipment, ancillary plant, parts and attachments.

**Problems**

'Anticipate and solve problems' means resolve a wide range of routine and non-routine problems, using product and process knowledge to develop solutions to problems which do not have a known solution/a solution recorded in the procedures.

Typical process and product problems may include:

- component materials incompatible or not to specification
- incorrect alignment or assembly in welding process
- welding edge, joint, fillet, gusset or seam not suitable for welding
- material feed systems not correctly sequenced (continuous production)
- incorrect selection of welding process
- surface moisture contacting welding or fusion points
- misalignment of welding contacts or die components
- sequencing problems, procedure too fast or too slow
- incorrect materials selected
- poor surface preparation
- bonding problems, weld does not meet specification
- surface and finish defects.

**Variables**

Key variables to be monitored include:

- differences between actual and set temperatures
- speeds (including feed speed for filler, speed of weld head)
- colour and uniformity
- surface finish/appearance
- tolerance for weld/joint
- consistency of weld
- product output rate
- product integrity and general conformance to specification and quality sample
- mechanical strength of weld (eg tensile strength results).
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**Unit Sector(s)**

Not applicable.