



Australian Government

Department of Education, Employment and Workplace Relations

PMBTECH301B Use material and process knowledge to solve problems

Revision Number: 1

PMBTECH301B Use material and process knowledge to solve problems

Modification History

Not applicable.

Unit Descriptor

Unit descriptor

This competency covers the application of a knowledge of polymers, their additives and their interactions with the process to the solving of problems. It may be applied in any sector of the industry. This unit covers polymer properties and their application in general to processes.

The application in specific processes is covered in the specific process units.

This competency is typically performed by advanced operators working either independently or as part of a work team.

Application of the Unit

Application of this unit

This competency applies to advanced operators who recognise potential process problems and analyse process problems using their knowledge and understanding of the polymer materials they are processing. The problems are broader and/or require more knowledge of the properties of polymers than those which apply to a single work station and which may be an element of a 'PROD' competency.

It includes:

- a basic knowledge of different polymer materials
- a basic knowledge of the applications of different polymers
- a basic knowledge of the different properties of polymers
- an understanding of the relationship between process conditions and polymer properties.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisites

This unit of competency has **no** prerequisites.

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

ELEMENT ELEMENT	PERFORMANCE CRITERIA 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 and apply applications of polymer materials.	1.1 Identify typical applications for common polymer materials. 1.2 Recognise physical properties of common polymers. 1.3 Use additives with knowledge of the effects of using the incorrect amount/type of additive. 1.4 Handle additives to minimise the associated.
2. Identify and apply impacts of impurities on polymer products.	2.1 Identify major impurities of concern to product and process. 2.2 Examine polymer materials for impurities. 2.3 Apply corrective actions to remove/compensate for impurities.
3. Determine expected material properties from polymer type and grade.	3.1 Identify the relationship between polymer type and polymer characteristics. 3.2 Identify the relationship between polymer grade and degree of polymerisation. 3.3 Identify the influence of polymer structure on properties.
4. Solve process problems related to polymer flow characteristics.	4.1 Use polymer flow test methods and recognise the importance of flow properties to the process. 4.2 Control critical factors leading to changes of state of the polymer during processing using knowledge of the causes. 4.3 Identify the relationship between polymer flow and other polymer properties. 4.4 Recognise process/product signs of incorrect polymer flow characteristics. 4.5 Recommend corrective actions for problems caused by polymer flow.
5. Solve process/product problems related to heating and cooling of product/ material in process.	5.1 Recognise the importance of the degree of cross linking on product properties if appropriate. 5.2 Recognise the importance of the degree of crystallisation/ crystal size on product properties if appropriate. 5.3 Recognise the impact of shrinkage on product

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	properties if appropriate. 5.4 Recognise the impact of annealing on product properties if appropriate. 5.5 Recognise process/product signs of incorrect heating/ cooling. 5.6 Recommend corrective actions for problems caused by heating.
6. Solve process problems related to polymer faults	6.1 Recognise an actual or a potential process problem. 6.2 Analyse that problem in a formal manner. 6.3 Determine appropriate corrective action. 6.4 Implement that corrective action if it is within the range of workplace authority. 6.5 Make recommendations for corrective action outside range of workplace authority. 6.6 Follow through on corrective action and make sure problem is resolved.

Required Skills and Knowledge

This describes the essential skills and knowledge and their level required for this unit. Knowledge of polymers and how their properties vary and the relevance to these properties to processing and product. Descriptions of polymer molecular shape and arrangement should be limited to commonly accepted diagrammatic representations of these structures. Knowledge of organization procedures and relevant regulatory requirements along with the ability to implement them within appropriate time constraints and work standards.

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

- type of polymer and polymer structure
- impact of additives
- the importance of flow and flow properties
- the impact of temperature and heating/cooling rate on processing and properties

Competence also includes the ability to distinguish between the causes of faults such as:

- wrong raw materials/additives or wrong grade
- incorrect quantity of materials/additives
- contaminated materials/additives
- out of specification materials
- process set-up and/or operation.

Language, literacy and numeracy requirements

This unit requires the ability to read and interpret technical specifications and similar information.

Writing may be required to the level of completing workplace forms.

Numeracy is required to the level of understanding the significance of numbers and being able to interpret numerical data.

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 *PMBPROD235B Use materials and process knowledge to complete work operations*, 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 apply a theoretical understanding of polymers to workplace problems.

Assessment method and context

Assessment will occur using industrial polymers and work-like scenarios.

Competence in this unit may be assessed:

- using appropriate, industrial scenarios and problems
- in a situation allowing for the generation of evidence of the ability to recognise, anticipate and solve 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 applies to all work environments and sectors within the plastics, rubber and cabling industry. It includes the operation of all relevant equipment.

Standard procedures means all relevant workplace procedures, work instructions, temporary instructions and relevant industry and government codes and standards.

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.

Polymer properties

Polymer properties related to flow include:

- molecular weight
- molecular structure

- factors effecting viscosity.

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.

Unit Sector(s)

Not applicable.