



Australian Government

Department of Education, Employment and Workplace Relations

PMBTECH403B Test fibre-composites materials and laminates

Revision Number: 1

PMBTECH403B Test fibre-composites materials and laminates

Modification History

Not applicable.

Unit Descriptor

Unit descriptor

This competency covers the knowledge and skill applied in testing fibre reinforced plastics materials and laminates for conformance with design and product quality specification.

Application of the Unit

Application of this unit

This competency applies to technicians who will determine test specifications and carry out a variety of tests on fibre-composite materials and products according to industry codes of practice and AS/NZ standards. This competency is typically performed by technicians working either independently or as part of a work team.

It includes:

- raw material applications (eg resin viscosity, specific gravity of resins and gelcoats, gel time, resin exotherm, monomer content, heat deflection temperature, styrene emission, resin colour, gelcoat water resistance)
- laminate applications (eg Barcol hardness, tensile strength and elongation, compressive strength, flexural strength and flexural modulus, impact strength, glass content, water absorption, product weathering capabilities, dielectric strength, flammability, acid and alkali resistance, thickness testing)
- test applications (eg comparing use of common resins and reinforcements in laminates, comparing the tensile strength of given laminates with metals, comparing test failure modes of laminate samples with metals).
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisites

This unit 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. Determine test requirements.	1.1 Identify properties to be measured according to specification. 1.2 Select appropriate test methods according to specifications. 1.3 Select appropriate testing equipment according to standards and specifications.
2. Perform raw material tests.	2.1 Prepare samples according to specification. 2.2 Perform tests in accordance with job specifications. 2.3 Record test results according to standard procedures. 2.4 Interpret test results and compare with manufacturer material data sheets.
3. Perform moulded product tests.	3.1 Prepare samples according to specification. 3.2 Perform tests in accordance with job specifications. 3.3 Record test results according to standard procedures. 3.4 Interpret test result and compare against quality specification.
4. Record and report test results.	4.1 Document tests to enterprise requirements. 4.2 Compare results against standards. 4.3 Make written recommendations (eg process control actions, raw material suitability, product acceptance).

Required Skills and Knowledge

This describes the essential skills and knowledge and their level required for this unit. Knowledge and understanding of the materials, equipment and process sufficient to predict their interactions and their impacts on performance. (For example, as resin is heated, its viscosity reduces. If viscosity is too low, there is a risk that the mould will fill before the fibre is fully impregnated; if too high, the reinforcement will have a tendency to distort.)

Knowledge of organization procedures and policies, quality requirements at each production stage and relevant regulatory requirements along with the ability to implement them within appropriate time constraints and in a manner relevant to the job.(eg manufacturing design requirements, enterprise requirements for testing documentation).

Knowledge as a basis for solving process and material problems:

- types of tests, their purposes and functions
- product or material test performance indices within standard variation, and standard response procedures
- safe test procedures
- role of testing in quality control and quality assurance procedures
- interpreting manufacturer material data sheets
- interpreting variances from specifications
- safety factors;
- effects on laminate design
- relevance of failure mode to FRP laminate design
- effect of creep and fatigue on laminates
- relationship of laminate thickness to bonding and material properties
- span and deflection.

Language, literacy and numeracy requirements

This unit requires the ability to interpret technical specifications and standard laboratory procedures.

It also requires report writing, including graphical representations of results

Numeracy is required to perform required calculations and interpret results.

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.

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:

- select and apply the appropriate test methods for the job, and correctly interpret the test results
- identify and take appropriate action on problems and potential problems.

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

- tests are performed to procedures at all times
- all safety procedures are always followed.

Assessment method and context

Assessment will occur on appropriate fibre composite testing equipment and will be undertaken in a work-like environment.

Competence in this unit may be assessed:

- by direct observation using appropriate testing equipment
- in a situation allowing for the generation of evidence of the ability to 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.

Additional resources might include sets of specifications from which test requirements might be determined and a range of samples of materials/products from which test samples might be prepared and then tests conducted.

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 the testing of raw materials and moulded laminates, using a range of standard testing equipment and test methods within the plastics industry.

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:

- testing equipment such as gel timer, flow meter, tensile tester, hardness tester, mold flow indexer, flammability/smoke tester, flexular tester etc.)
- materials handling equipment
- relevant PPE
- equipment as specified by AS/NZ standards (where applicable).
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Unit Sector(s)

Not applicable.