



Australian Government

Department of Education, Employment and Workplace Relations

PMBTECH503B Determine rheology and output of plastics materials from processing equipment

Release: 1

PMBTECH503B Determine rheology and output of plastics materials from processing equipment

Modification History

Not applicable.

Unit Descriptor

Unit descriptor

This competency covers the application of knowledge of polymer rheology to the flow of polymers through processing equipment, including extruders and injection moulding equipment and the dies and moulds fitted to that equipment.

This competency is typically performed by senior technicians.

Application of the Unit

Application of this unit

This competency applies to technicians who need to perform calculations using the rheological properties of polymers and apply that to their performance in process equipment. It includes:

- Newtonian and non-Newtonian flow
- shear force and shear rate calculations
- output calculations
- density/temperature/viscosity relationships and calculations.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisites

This unit of competency has a prerequisite of *PMBTECH401B Predict polymer properties and characteristics*.

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 flow characteristics of polymer compound.	1.1 Calculate and describe shear and shear rates. 1.2 Distinguish between Newtonian and non-Newtonian flow. 1.3 Identify the characteristics of polymer structures which influence flow. 1.4 Identify the relationships between density, temperature and viscosity for polymers. 1.5 Identify the flow characteristics of a polymer compound based on its structure and temperature.
2. Calculate flow rate of polymer compound.	2.1 Use equipment dimensions and data to determine shear rate of polymers through that equipment. 2.2 Calculate output from equipment using viscosity curves and shear rate diagrams. 2.3 Calculate mean velocity at critical points in a process. 2.4 Determine the characteristic curves for the screws and dies in processing equipment, and the resultant operating point for the system.

Required Skills and Knowledge

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

Knowledge and understanding of the principles of rheology, how rheological properties vary with temperature and how they impact on process efficiency and equipment design.

Knowledge of organization procedures and policies along with the ability to implement them within appropriate time constraints and in a manner relevant to the job.

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

- Newtonian flow
- non-Newtonian flow
- density/temperature/viscosity relationships
- quantitatively determining shear, shear rate, output, viscosity/density changes with temperature.

Language, literacy and numeracy requirements

This unit requires high level numeracy skills such as are needed for the use of complex algebraic equations, non-linear functions, simultaneous equations and the interpretation of non-linear graphs. Literacy is also required at least equivalent to senior secondary school.

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 ability to determine and apply rheology to relevant polymers.

Assessment method and context

Assessment will occur using relevant industrial polymers and rheology relevant to the process/product and will be undertaken in a work-like environment.

Competence in this unit may be assessed:

- using an appropriate, industrial polymers and rheology relevant to the process/product
- 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 unit includes the rheology of major polymer compounds and the temperature and shear effects on viscosity.

This competency applies to all sectors within the plastics, rubber and cabling industry. Standard procedures means all relevant workplace procedures, 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.

Unit Sector(s)

Not applicable.