



Australian Government

Department of Education, Employment and Workplace Relations

PMBPROD375B Vulcanise products using an autoclave

Revision Number: 1

PMBPROD375B Vulcanise products using an autoclave

Modification History

Not applicable.

Unit Descriptor

Unit descriptor

This unit applies to the application of knowledge of materials, product purpose and processes to the autoclave production of vulcanised rubber products.

Application of the Unit

Application of this unit

This competency typically applies to advanced operators who load green rubber products into an autoclave for curing/vulcanising. The key factors are ensuring compatible loads and the right curing time, temperatures and pressures. It also requires using a range of well developed skills, requiring some discretion and judgement to recognise and resolve a range of problems. The operator will:

- identify and plan own work requirements from production requests
- load green products and remove cured products
- choose and set the right autoclave conditions
- monitor autoclave temperature and pressure profiles during the curing process
- check settings and adjustments of equipment
- make appropriate adjustments to correct materials, equipment or process variations
- solve routine and non-routine autoclave and vulcanising problems, seeking guidance where necessary or appropriate
- complete logs and reports.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisites

This unit has **no** prerequisites.

Employability Skills Information

Employability Skills

The required outcomes described in this unit contain applicable Employability Skills. The Employability Skills Summary of the qualification(s) in which this unit is packaged will assist in identifying Employability Skill requirements.

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. Plan own work requirements.	1.1 Identify work requirements from workplace procedures 1.2 Identify equipment and processes used for materials preparation, vulcanising and any related production process and for the downstream operations. 1.3 Identify operating principles and components of vulcanising equipment. 1.4 Identify hazards connected with materials and process from workplace reference materials including materials safety data sheets and equipment instructions. 1.5 Implement measures to control identified hazards in line with procedures and duty of care. 1.6 Identify requirements for materials, quality, production and equipment checks.
2. Set up autoclave vulcanising process.	2.1 Identify and read equipment information, quality specifications and standard operating procedures. 2.2 Check heat and pressure settings and process adjustments for conformity to procedures. 2.3 Compare equipment and material condition to known optimum condition and take appropriate action in accordance with procedures (including, where authorised, making adjustments within overall specifications to process settings to ensure product output quality is appropriate). 2.4 Check that all gauges are operating, safety features are activated or fitted, locks and guards are in place.
3. Operate and make adjustments to the autoclave process to procedures.	3.1 Load and close autoclave and bring on line. 3.2 Monitor production outputs, equipment operating temperatures and pressures. 3.3 Make adjustments to remedy faults and non-conformity as required. 3.4 Shut down, vent and unload autoclave. 3.5 Take samples as required and identify product out

ELEMENT ELEMENT	PERFORMANCE CRITERIA
	<p>Performance criteria describe the required performance needed to demonstrate achievement of the element. Assessment of performance is to be consistent with the evidence guide.</p> <p>of specification.</p> <p>3.6 Note and report non-conformity to required workplace specifications, following workplace procedures.</p> <p>3.7 Clean, adjust and lubricate equipment as required.</p> <p>3.8 Pause or stop equipment in an emergency, following procedures.</p>
4. Respond to product quality improvement requests.	<p>4.1 Monitor vulcanising process and note conditions which may affect product quality standards.</p> <p>4.2 Report process variations.</p> <p>4.3 Note and implement changes in standard operating procedures and specifications.</p>
5. Anticipate and solve problems	<p>6.1 Recognise a problem or a potential problem</p> <p>5.2 Determine problems needing priority action.</p> <p>5.3 Refer problems outside area of responsibility to appropriate person, with possible causes.</p> <p>5.4 Seek information and assistance as required to solve problems.</p> <p>5.5 Solve problems within area of responsibility.</p> <p>5.6 Follow through items initiated until final resolution has occurred.</p>

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. For example,

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

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

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

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

- characteristics of materials and behaviour in relation to heat, thickness and cure rates.
- identify the function of vulcanising equipment, components and the materials used
- changes to materials at various stages of production
- relationship between steam pressure and temperatures and the effects this and time will have on product quality and production output
- impact of heat and pressure in relation to providing strength, stiffness, resistance to deformation, fatigue and abrasion
- monitor equipment operation and product quality
- impact of product section/thickness on cure requirements
- impact of compound cure system on cure requirements
- impact of heating too quickly/slowly on final product properties
- compound properties and their interactions with process conditions
- relationships between compound properties and process conditions
- changes to compound properties to better suit process requirements
- product problems related to compound properties
- product problems related to process conditions
- adjustments to process conditions to meet compound and product requirements.

Competence also includes the ability to:

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

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, quality assurance records and production reports.

Basic numeracy is also required, eg to determine required steam pressure to give necessary time/temperature cycle.

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:

- identify critical materials properties and rubber vulcanising process characteristics in relation to the process requirements and the end product
- make adjustment to the process as required.
- identify and take appropriate action on problems and potential problems.

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.

Assessment method and context

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

Competence in this unit may be assessed:

- on an appropriate operating plant 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 applies to the production of vulcanised rubber products within the rubber industries. It includes the operation of all relevant additional equipment where that equipment is integral to the vulcanising autoclave process. It includes the operation of all ancillary steam equipment, but not boiler operation.

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 competency includes use of equipment and tools such as:

- hand carts and trolleys
- knives and other trimming equipment
- hoists/lifting equipment not requiring any special permits or licences
- basic hand tools
- relevant personal protective equipment.

Hazards

Typical hazards include:

- heat
- confined spaces
- manual handling hazards
- knife hazards.

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:

- air/water blinding of steam equipment
- faulty/unreliable gauges
- matching loads requiring the same cure conditions
- adjusting temperature/pressure profile to match load and product
- wrong cure cycle
- changed product cure systems/section
- steam problems.

Appropriate action for problems outside of area of responsibility may be reporting to an appropriate person.

Appropriate action for solving problems within area of responsibility includes asking questions and seeking assistance from appropriate persons/sources.

Variables

Key variables to be monitored include:

- operating temperatures
- stacking and loading off product for autoclaving
- material composition
- operating pressure
- cycle time
- output rate
- product integrity and general conformance to specification and quality sample.
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Unit Sector(s)

Not applicable.