



Australian Government

Department of Education, Employment and Workplace Relations

PMASMELT264B Start up reduction cells

Revision Number: 1

PMASMELT264B Start up reduction cells

Modification History

Not applicable.

Unit Descriptor

Unit descriptor	This competency applies to plant technicians who bake out and start up reduction cells used in the aluminium smelting process.
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Application of the Unit

Application of the unit	Typically the reduction cells would be started up after refurbishment or repair and may have a new cathode lining. This competency unit typically covers items of equipment, such as: • reduction cell (pot) • carbon anodes • bake out equipment • cell tending equipment (may require <i>PMASUP237B Undertake crane, dogging and load transfer operations</i>) The plant technician would: • prepare the refurbished or repaired cell for start up • bake out the cathode lining • start up the cell, including transfer of bath • monitor the performance of the cell, ready for operation • recognise and respond to 'out-of-parameter' issues • respond to emergency situations • identify and control hazards in the workplace. Generally the operator would be part of a team during start up and shut down procedures and would be expected to be capable of demonstrating competence in all parts of this unit. At all times they would be liaising and cooperating with other members of the team.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Prerequisite units		
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Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Plan and prepare for operations.	1.1. Interpret and confirm work requirements before proceeding 1.2. Identify and control hazards 1.3. Ensure appropriate authorisations have been obtained/issued 1.4. Identify work flow path (interruptions or bottlenecks) blockage
2. Conduct pre-start requirements to procedures.	2.1. Conduct routine pre-start equipment checks 2.2. Conduct isolation as appropriate for pre-start inspections 2.3. Prepare equipment for operation 2.4. Complete routine equipment checklists 2.5. Complete reports as required for equipment inspections.
3. Start up reduction cell to procedures.	3.1. Start up reduction cell 3.2. Monitor equipment operation and check operational variables are within parameters. 3.3. Verify equipment performance throughout the process 3.4. Apply operating principles to identify problems and take appropriate action 3.5. Shut down reduction cell as required 3.6. Conduct routine housekeeping activities 3.7. Complete records as required for equipment operation and performance.
4. Isolate and de-isolate plant	4.1. Isolate plant 4.2. Make safe for required work 4.3. Check plant is ready to be returned to service 4.4. Prepare plant for return to service.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

Competence includes being able to demonstrate the following:

- efficient and effective operation of plant/equipment
- hazard analysis
- completing plant records
- communication
- problem solving.

Competence includes responding to emergency situations such as:

- tap outs
- evacuation due to fire
- loss of power
- excessive emissions of fumes or particulate
- equipment failure
- recognising hazards associated with electromagnetic effects, moisture, wet bath and wet soda ash.

Troubleshooting a range of problems which could include or be related to:

- electrical faults
- interpreting information from process control system
- equipment failure
- cell instability
- feeder problems
- anode effect poles
- metal tapping
- bath tapping
- beam height
- anodes
- current draw
- materials handling systems
- bake process
- loading anodes and anode effect.

Required knowledge

Competence includes a comprehensive understanding of the reduction cell process and equipment principles and typical problems to a level needed to control the operation, and recognise and resolve operational problems. In particular it includes:

REQUIRED SKILLS AND KNOWLEDGE

- awareness of hazardous materials, recognition of spills or escapes, personal protective equipment required, isolation and clean up requirements (eg CTPV)

and knowledge of:

- all items on a schematic of the reduction cell process and the function of each
- basic principles of operation of main equipment items, including cathode bed, anodes and adjusters, feeders, bath conditions, current distribution
- basic understanding of the product specifications, including depth of cover and uniformity of aluminium layer, and variations required on the input and output side
- basic understanding of the bake process (gas bake or resistor bake)
- understanding of the cell preparation process, including cathode bed, thermocouples, feeders, fittings and connections, bake process, anode installation, bath transfer, shunt removal
- isolating a problem to an item of equipment/stage of process
- methods of resolving problems.

Evidence Guide

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 the Training Package.

Overview of assessment

Assessment for this unit of competency will be on an operating plant. The unit will be assessed in as holistic a manner as is practical and may be integrated with the assessment of other relevant units of competency. Assessment will occur over a range of situations which will include disruptions to normal, smooth operation.

Simulation may be required to allow for timely assessment of parts of this competency unit (eg Elements 2, 5). Simulation should be based on the actual plant and will include walk-throughs of the relevant competency components. Simulations may also include the use of case studies/scenarios and role plays.

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

Competence must be demonstrated in the ability to recognise and analyse potential situations requiring action and then in implementing appropriate corrective action.

The emphasis should be on the ability to stay out of trouble rather than on recovery from a disaster:

- emergency responses are known
- hazards are recognised and all site requirements to reduce or remove hazards are known and completed as part of the job.
- early warning signs of equipment/processes needing attention or with potential problems are recognised, that is, monitoring systems in the reduction cell process, including equipment, material handling systems and mobile equipment.

These aspects may be best assessed using a range of scenarios/case studies/what-ifs as the stimulus with a walk-through forming part of the response. These assessment activities should include a range of problems, including new, unusual and improbable situations that may have been generated from the past incident history of the plant, incidents on similar plants around the world, hazard analysis activities and similar

EVIDENCE GUIDE	
	sources.
Context of and specific resources for assessment	Assessment will require access to an operating plant over an extended period of time, or a suitable method of gathering evidence of operating ability over a range of situations. A bank of scenarios/case studies/what-ifs will be required as will a bank of questions which will be used to probe the reasoning behind the observable actions.
Method of assessment	In all plants it may be appropriate to assess this unit concurrently with relevant teamwork and communication units. Consider co-assessment with other relevant units. This competency may be assessed in conjunction with: • <i>MSAPMOHS200A Work safely</i> • <i>MSAPMOHS110A Follow emergency response procedures</i> • <i>MSAPMSUP205A Transfer loads</i> Other units which are relevant to the job.
Guidance information for assessment	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.

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. Bold italicised wording, if used in the Performance Criteria, is detailed below. 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.

Codes of practice/ standards	Where reference is made to industry codes of practice, and/or Australian/international standards, the latest version must be used.
Appropriate action	Appropriate action includes: • determining problems needing action • determining possible fault causes • rectifying problem using appropriate solution within area of responsibility • following through items initiated until final resolution has occurred • reporting problems outside area of responsibility to designated person.
Emergency responses	Emergency responses include those related to: • leak/loss of containment • evacuation due to fire or open cell circuit • loss of power • excessive emissions of fumes or particulate • major oil spill • equipment failure
Equipment and tools	Equipment and tools may include: • hand tools • harnesses and slings • materials handling equipment.
Hazards	Hazards may include: • heat (burns, dehydration and heat stress) • energy sources, eg hydraulic, pneumatic and electric • electro magnetic effects • high pressure piping and valves • pinch and crush points • moisture • banned items • mobile equipment and pedestrian interaction

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	• suspended loads and roller conveyors • hazardous materials, eg reactive alumina, kaowool, tar and pitch • molten materials.
Hazard control methods	Hazard control measures should follow the hierarchy of control, be specific to the hazard and work area and include relevant Personal Protective Equipment
Housekeeping	Housekeeping procedure may include cleaning the area, removal of contaminants, safety inspections and rectification of issues that could compromise safety.
Instrument/electrical systems	Instrument/electrical systems may include: • bake out equipment • emergency shutdown systems • fire systems • pressure and temperature control systems • communications systems • utility systems.
Isolation	Isolation refers to the complete isolation of the equipment from all sources of power or energy or isolate process flows and movement of machinery such to render it safe to work on as per site procedure.
Monitoring systems	Monitoring systems may include: • monitoring the operation of reduction cell • monitoring the effectiveness of the process • condition of the bath • monitoring abnormal trends in the operation of equipment or product specification.
Monitor and adjust operational variations	• Monitor and adjust operational variations using troubleshooting techniques may refer to the use of: • historical data and records of common faults • troubleshooting lists and directives • site procedures.
Out-of-parameter issues	Out-of-parameter issues, faults and problems may include: • tap out • out-of-parameter operation or product • fluctuation in temperature, power consumption or product movement.

RANGE STATEMENT	
	• instruments and equipment requiring cleaning • equipment mechanical and electrical problems • flow path blockages • out-of-parameter emissions • unavailability of equipment, personnel or material.
Personal protective equipment	Personal Protective Equipment (PPE) requirements relate to the specified PPE for the task or job to be undertaken. PPE may include specific insulated boots, heat resistant material, full-ventilated suits, full-face masks or situation specific equipment.
Pre-start checks	Pre-start checks relate to the required site or equipment pre-start checklist and must be completed before the equipment is operated or as otherwise stated in the procedures.
Procedures	Procedures may be written, verbal, computer-based or in some other form. They include: • all work instructions • standard operating procedures • formulas/recipes • batch sheets • temporary instructions • any similar instructions provided for the smooth running of the plant. For the purposes of this Training Package, 'procedures' also includes good operating practice as may be defined by industry codes of practice (eg Responsible Care) and government regulations.
Shutdown procedures	Shut down procedure must follow equipment and site authorised checklist and may include: • communication to supply and delivery areas • communication to impacting areas • obtaining appropriate authorisations • rescheduling operations • liaison with maintenance teams.
Reports and records	Reports and records may include: • computer readouts locally or in the control room • routine inspections (daily readings, monthly checks) • scheduled maintenance activities • shift log sheet

RANGE STATEMENT	
	• mandatory or statutory inspections • hazard, accident and incident reports • quality inspection reports of the product.
Start up procedures	Start up procedure will conform to site procedure and include: • safety and pre-start checks • accessing shift logs and equipment records • pre-shift briefing information • records and reports from the previous shift.
Work requirements	Work requirements includes shift briefings, shift logs supervisor or crew leader meetings, toolbox talks and handover details.
Health, safety and environment (HSE)	All operations to which this unit applies are subject to stringent health, safety and environment requirements, which may be imposed through State or Federal legislation, and these must not be compromised at any time. Where there is an apparent conflict between Performance Criteria and HSE requirements, the HSE requirements take precedence. Persons are required to have skills in hazard identification, assessment and application of control measures, eg spills and leaks identified, contained and cleaned up. Exposure to hazardous materials requires minimal personal contact, recognition of hazards and appropriate controls.

Unit Sector(s)

Unit sector	Operational/technical
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Competency field

Competency field	
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Co-requisite units

Co-requisite units		
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