



Australian Government

PMASMELT261 Bake carbon anodes

Release: 1

PMASMELT261 Bake carbon anodes

Modification History

Release 1. Supersedes and is equivalent to PMASMELT261B Bake carbon anodes

Application

This unit of competency covers the skills and knowledge required to operate the carbon bake processes in the production of carbon anodes used in the aluminium smelting process.

This unit of competency applies to operators who are required to operate and monitor all equipment in the carbon anode bake process, apply re-start, start-up and shutdown procedures, isolate and de-isolate plant, and recognise and respond to 'out-of-parameter' issues.

This unit of competency applies to an individual working alone or as part of a team or group and working in liaison with other shift team members and the control room operator, as appropriate. The operator would be part of a team during start up and shut down procedures.

This unit of competency does not require the operation of a central control panel.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil

Competency Field

Operations

Unit Sector

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

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 blockages (interruptions or

- bottlenecks)
- 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 **Conduct carbon bake operations to procedures**
 - 3.1 Start up anode bake and ancillary equipment
 - 3.2 Monitor equipment operation and check operational variables are within parameters
 - 3.3 Verify equipment performance throughout the process
 - 3.4 Adjust equipment/variables in accordance with procedures
 - 3.5 Apply operating principles to identify problems and take action
 - 3.6 Shut down anode bake and ancillary equipment as required
 - 3.7 Conduct routine housekeeping activities
 - 3.8 Recognise and respond to emergencies should one arise
 - 3.9 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 De-isolate and prepare plant for return to service

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Regulatory framework

The latest version of all legislation, regulations, industry codes of practice and Australian/international standards, or the version specified by the local regulatory authority, must be used, and include one or more of the following:

- legislative requirements, including work health and safety (WHS)
- industry codes of practice and guidelines
- environmental regulations and guidelines
- Australian and other standards
- licence and certification requirements

All operations to which this unit applies are subject to stringent health, safety and environment (HSE) requirements, which may be imposed through state/territory 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.

Equipment and tools

Equipment and tools include one or more of the following:

- carbon anode furnace
- ancillary equipment, such as scrubbers and fans
- conveyors
- cranes
- mobile equipment, such as scissor lifts, forklifts and front-end loaders
- harnesses and slings
- materials handling equipment
- hand tools

Procedures

All operations must be performed in accordance with relevant procedures.

Procedures are written, verbal, visual, computer-based or in some other form, include one or more of the following:

- emergency procedures
- work instructions
- standard operating procedures (SOPs)
- safe work method statements (SWMS)
- formulas/recipes
- batch sheets
- temporary instructions
- any similar instructions provided for the smooth running of the plant

Hazards

Hazards include one or more of the following:

- open furnace pits, ring main risers, fire shaft pit, riser shaft and natural gas
- heat (e.g. burns, dehydration and heat stress)
- energy sources (e.g. hydraulic, pneumatic and electric)
- high pressure piping and valves
- pinch and crush points
- moisture
- banned items
- mobile equipment and pedestrian interaction
- furnace emissions
- suspended loads and roller conveyors
- hazardous materials (e.g. reactive alumina, kaowool, tar and pitch)
- molten materials
- equipment failures
- industrial (machinery, equipment and product)
- equipment or product mass
- noise, rotational equipment or vibration
- other hazards that might arise

Routine problems

Routine problems must be resolved by applying known solutions.

Routine problems are predictable and include one or more of the

following:

- temperature and oxygen fluctuations
- production line speed variations
- variation of product specification on the input and output side
- electrical problems
- instruments and equipment requiring cleaning
- equipment mechanical problems
- flow path blockages
- out-of-parameter emissions
- unavailability of equipment, personnel or material

Known solutions are drawn from one or more of the following:

- procedures
- training
- remembered experience
- historical data and records of common faults
- troubleshooting lists and directives
- site procedures

Non-routine problems must be reported according to according to relevant procedures.

Instrument/electrical systems

Instrument/electrical systems include one or more of the following:

- emergency shutdown systems (ESD)
- fire systems
- pressure and temperature control systems
- communications systems
- utility systems

Operate

Operate is to monitor, adjust/make change to the production unit and/or its component items to meet specifications, by one or both of the following:

- manually in the plant
- using local controller in the plant

Pre-start checks

Pre-start checks will conform to site procedures or equipment pre-start checklist. They must be completed before the equipment is operated unless stated in the procedures.

Reports

Reports and records include one or more of the following:

- routine inspections (daily readings and monthly checks)
- scheduled maintenance activities
- computer readouts locally or in the control room
- shift log sheet
- mandatory or statutory inspections
- hazard, accident and incident reports
- quality inspection reports of the product

Shutdown procedures

Shutdown procedure must follow equipment and site authorised checklist and will typically include the following:

- communication to supply and delivery areas
- communication to impacting areas
- obtaining appropriate authorisations
- rescheduling operations
- liaison with maintenance teams

Start-up procedures

Start-up procedure must conform to site procedures and will typically include the following:

- 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 will be identified from one or more of the following:

- shift briefings
- shift logs
- supervisor or crew leader meetings
- toolbox talks
- handover details

Unit Mapping Information

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Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=9fc2cf53-e570-4e9f-ad6a-b228ffdb6875>

Assessment Requirements for PMASMELT261 Bake carbon anodes

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria, and include the ability to:

- monitor equipment conditions and maintenance requirements and take action
- monitor process parameters and performance and make adjustments according to procedures
- recognise early warning signs of equipment/processes needing attention or with potential problems
- isolate and de-isolate equipment
- identify hazards and apply hazard control procedures
- respond to emergencies
- apply housekeeping procedures including cleaning the area, removal of contaminants, safety inspections and rectification of issues that could compromise safety.

Knowledge Evidence

Evidence must be provided that demonstrates knowledge of:

- all items on a schematic of the carbon bake process and functions of each
- basic principles of operation of main equipment items, including scrubbers, port plates, thermocouples and burner tips
- basic physics of operation, including effects of temperature, conveyor speed and time on anode quality
- basic understanding of the product specifications and variations required on the input and output side
- process parameters and limits (e.g. temperature, moisture, pressure and flow)
- emergency responses, including those related to:
 - open furnace pits
 - ring main risers
 - fire shaft pit
 - riser shaft
 - natural gas usage
 - rain and water in electrical ducts
 - explosions due to loss of draft
 - evacuation due to fire

- loss of power
- excessive emissions of fumes or particulate
- equipment failure
- typical hazards associated with reactive alumina, tar, pitch, kaowool, suspended loads and heat stress, and how to recognise them
- correct use of personal protective equipment (PPE), including specific insulated boots, heat resistant material, full-ventilated suits, full-face masks and other situation-specific equipment.

Assessment Conditions

- The unit should be assessed holistically and the judgement of competence based on a holistic assessment of the evidence.
- The collection of performance evidence:
 - should occur over a range of situations which include typical disruptions to normal, smooth operation of an operating plant
 - will typically include a supervisor/third-party report focussing on consistent performance and problem recognition and solving. A supervisor/third-party report must be prepared by someone who has a direct, relevant, current relationship with the person being assessed and who is in a position to form a judgement on workplace performance relevant to the unit of competency
 - must include the use of an appropriate industrial item of equipment requiring demonstration of operation, start-up and shutdown procedures and responding to problems
 - may use industry-based simulation for part only of the unit where safety, lack of opportunity or significant cost is an issue.
- Assessment should occur in operational workplace situations. Where this is not possible, or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment reflecting realistic operational workplace conditions. This must cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.
- Assessment in a simulated environment should use evidence collected from one or more of:
 - walk-throughs
 - pilot plant operation
 - demonstration of skills
 - industry-based case studies/scenarios
 - 'what ifs'.
- Knowledge evidence may be collected concurrently with performance evidence (provided a record is kept) or through an independent process, such as workbooks, written assessments or interviews (provided a record is kept).
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications associated with this unit.
- The regulatory framework will be reflected in workplace policies and procedures and is not required to be independently assessed.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.
- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- In addition, the assessor or anyone acting in subject matter expert role in assessment must demonstrate both technical competency and currency. If the assessor cannot demonstrate technical competency and currency they must assess with a subject matter expert who does meet these requirements.
- Technical competence can be demonstrated through one or more of:
 - relevant VET or other qualification/Statement of Attainment
 - appropriate workplace experience undertaking the type of work being assessed under routine and non-routine conditions
 - appropriate workplace experience supervising/evaluating the type of work being assessed under routine and non-routine conditions
- Currency can be demonstrated through one or more of:
 - being currently employed undertaking the type of work being assessed
 - being employed by the organisation undertaking the type of work being assessed and having maintained currency in accordance with that organisation's policies and procedures
 - having consulted/had contact with an organisation undertaking the type of work being assessed within the last twelve months, the consultation/contact being related to assessment
 - conducting on-the-job training/assessments of the type of work being assessed
 - being an active member of a relevant professional body and participating in activities relevant to the assessment of this type of work

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