



Australian Government

PMAOPS361 Operate a smelting furnace

Release: 1

PMAOPS361 Operate a smelting furnace

Modification History

Release 1. Supersedes and is equivalent to PMAOPS361A Operate a smelting furnace

Application

This unit of competency covers the skills and knowledge required to operate a smelting furnace and ancillary equipment.

The smelting furnace will typically be used in an industrial scale metalliferous processing facility.

This unit of competency applies to ore smelting where the feed is a solid in the form of ore, crushed rock or a mixture which may include flux materials; and the product is molten metal and slag. The smelting process induces some chemical changes in the feed as well as melting the product. However, it may be applied to other materials with appropriate contextualisation.

This unit of competency applies to operations technicians who are required to demonstrate a significant understanding of the process and the equipment operation in order to identify and rectify operational problems, determine and apply the raw materials feed, contribute to start-up and shutdown processes, and operate and monitor equipment.

This unit of competency applies to an individual operating independently in a plant with local control or in liaison with the control room operator in a plant with a centralised control panel, such as distributed control system (DCS) type controls. In the case of large complex plant, the operations technician would be part of a team during start-up and shutdown procedures.

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.

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.

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| 1 | Prepare for work | 1.1 | Receive and give shift handover |
| | | 1.2 | Identify work requirements |
| | | 1.3 | Identify and control hazards |
| | | 1.4 | Coordinate with appropriate personnel |
| | | 1.5 | Check for recent work undertaken on smelter |
| | | 1.6 | Note any outstanding/incomplete work |
| | | 1.7 | Check operational status of smelter |
| | | | |
| 2 | Operate smelting furnace | 2.1 | Describe the type of smelter, the component plant items and their duties |
| | | 2.2 | Complete routine checks, logs and paperwork, taking action on unexpected readings and trends |
| | | 2.3 | Change rate, grade or specification smoothly as required |
| | | 2.4 | Adjust feeds composition and rate, gas flows and temperatures to meet product requirements |
| | | 2.5 | Adjust smelter and its component plant items as appropriate to their type and duty to maximise performance |
| | | | |
| 3 | Recognise problems and take action in accordance with procedures | 3.1 | Monitor smelter and its component plant items frequently and critically throughout shift using measured/indicated data and senses |
| | | 3.2 | Describe impacts of any changes upstream and downstream |
| | | 3.3 | Recognise actual and developing situations which may require action |

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| | | 3.4 | Apply operational knowledge to resolve problems |
| | | 3.5 | Take other actions on abnormal situations which cannot be resolved during the shift to ensure safety and the resolution of the situation |
| | | 3.6 | Follow through items initiated until final resolution has occurred |
| 4 | Isolate and de-isolate smelter and its component plant items | 4.1 | Complete any required pre-start checks |
| | | 4.2 | Start up/shut down smelter according to the smelter type and duty in liaison with other personnel |
| | | 4.3 | Start up/shut down/changeover component plant items within smelter unit according to their type and duty in liaison with other personnel |
| | | 4.4 | Isolate entire smelter and/or any component plant item |
| | | 4.5 | Make safe for required work |
| | | 4.6 | Check smelter/plant item is ready to be returned to service |
| | | 4.7 | De-isolate and prepare smelter/plant item 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 The latest version of all legislation, regulations, industry codes of practice and Australian/international standards, or the version specified by
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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.

Hazards

Hazards include one or more of the following:

- molten metal
- electricity
- gases and liquids under pressure
- structural hazards
- structural collapse
- equipment failures
- industrial (machinery, equipment and product)
- equipment or product mass
- noise, rotational equipment or vibration
- working at heights, in restricted or confined spaces, or in environments subjected to heat, dusts or vapours
- flammability and explosivity
- hazardous products and materials
- unauthorised personnel
- sharp edges, protrusions or obstructions
- slippery surfaces, spills or leaks
- extreme weather
- other hazards that might arise

Routine problems

Routine problems are predictable and have known solutions and include one or more of the following:

- variations in feed material
- control of gas flow
- control of feed rates, and composition of feeds
- control of tapping rates of slag and molten product

Non-routine problems Non-routine problems are unexpected problems, or variations of previous problems and must be resolved by applying operational knowledge to develop new solutions, either individually or in collaboration with relevant experts, to:

- determine problems needing action
- determine possible fault causes
- develop solutions to problems which do not have a known solution
- follow through items initiated until final resolution has occurred
- report problems outside area of responsibility to designated person

Operational knowledge includes one or more of the following:

- procedures
- training
- technical information, such as journals and engineering specifications
- remembered experience
- relevant knowledge obtained from appropriate people

Start up/shut down Start up shut down includes the following:

- start up and shut down to/from normal operating conditions
- start up and shut down to/from isolated, cold or empty
- start up and shut down to/from other conditions/situations experienced on the plant

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

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
Product	Product includes anything produced by a process step and so includes: • intermediate products, such as the product from one process step, which then becomes the feed for another
Logs and reports	Logs and reports include one or more of the following: • paper or electronic-based logs and reports • verbal/radio reports • reporting items found which require action
Work requirements	Work requirements will be identified from one or more of the following: • briefings • handovers • orders • compliance documentation • product specifications • nature and scope of tasks • achievement targets • operational conditions • lighting conditions • plant or equipment defects • hazards and potential hazards • coordination requirements or issues

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 PMAOPS361 Operate a smelting furnace

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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:

- use data and own senses to monitor plant and maximise performance
- adjust feeds, composition and rate, gas flows and temperatures to meet product requirements
- perform pre-start checks, start-up/shutdown procedures, and isolations and de-isolations
- apply process knowledge to monitor and take action on abnormal situations
- identify hazards and risks and apply risk control procedures.

Knowledge Evidence

Evidence must be provided that demonstrates knowledge of:

- all items on a schematic of the system and functions of each
- principles of operation of smelting furnace and ancillary equipment function, and troubleshooting of major components and their problems
- process-specific science (physics and chemistry) to the level of being able to interpret the science and extract factors controlling the process and product, and by-product production rate and quality (e.g. for chemistry interpret the equation for factors controlling rate and yield and also interfering reactions/by-products)
- process parameters and system integrity limits, including temperature, air pressure/flow, materials flow rates, fuel pressure/flow, gas/flux/ rates, product tolerances, limitations and specifications
- effects of varying furnace conditions, raw materials feed rates, quality, composition and proportions on finished product composition
- hierarchy of control
- hazards that may arise in the job/work environment, and:
 - their possible causes
 - potential consequences
 - appropriate risk controls.

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 operations
 - will typically include a supervisor/third-party report focusing 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 industrial style smelter allowing operation
 - may use industry-based simulation for part of the unit particularly 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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