



Australian Government

MEM04001 Operate melting furnaces

Release: 1

MEM04001 Operate melting furnaces

Modification History

Release 1. Supersedes and is equivalent to MEM04001B Operate melting furnaces

Application

This unit of competency defines the skills and knowledge required to operate melting furnaces.

It applies to the operation and operational maintenance of furnaces primarily used for continuous or staged bulk melting/smelting of a range of metals, holding of hot liquids, or the melting of metals for production processes, such as casting, moulding and galvanising.

Where the interpretation of technical drawings is required unit MEM09002 Interpret technical drawing should also be selected.

Where the selection and use of engineering measuring equipment is required unit MEM12023 Perform engineering measurements should also be selected.

Where the selection and use of tools is required unit MEM18001 Use hand tools and unit MEM18002 Use power tools/hand held operations, should also be selected as appropriate.

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

Band: A

Unit Weight: 4

Pre-requisite Unit

MEM11011	Undertake manual handling
MEM13004	Work safely with molten metals/glass
MEM13015	Work safely and effectively in manufacturing and engineering
MEM16006	Organise and communicate information

Competency Field

Casting and moulding

Elements and Performance Criteria

Elements describe the essential outcomes.

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

- | | | | |
|---|-----------------------------------|-----|---|
| 1 | Determine job requirements | 1.1 | Follow standard operating procedures (SOPs) |
| | | 1.2 | Comply with work health and safety (WHS) requirements at all times |
| | | 1.3 | Use appropriate personal protective equipment (PPE) in accordance with SOPs |
| | | 1.4 | Identify job requirements from specifications, job sheets or work instructions |
| | | | |
| 2 | Select materials | 2.1 | Complete requisitions as required according to SOPs |
| | | 2.2 | Undertake charge analysis and convert the charge analysis to furnace charge weight and weigh charge in accordance with SOPs |
| | | 2.3 | Enter routine and familiar information onto proformas and standard workplace forms |
| | | | |
| 3 | Start up furnace | 3.1 | Inspect furnace for any defects or damage |
| | | 3.2 | Identify faults and areas for routine repair of the furnace |
| | | 3.3 | Undertake routine operational maintenance of furnace |
| | | 3.4 | Start up furnace according to procedures |
| | | 3.5 | Report all start-up faults in accordance with procedures |
| | | | |
| 4 | Charge furnace | 4.1 | Identify and follow emergency/safety procedures |
| | | 4.2 | Pre-heat materials if required |
| | | 4.3 | Charge materials into furnace |
| | | 4.4 | Identify and keep available suitable areas for emergency unloading of molten metal |

Elements describe the essential outcomes.

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

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|---|----------------------------------|-----|--|
| 5 | Monitor furnace | 5.1 | Maintain furnace at optimum operating condition |
| | | 5.2 | Take sample for chemical analysis and apply remedial action as required |
| | | 5.3 | Dross and/or degas furnace |
| | | 5.4 | Check temperature of metal and adjust if necessary |
| | | | |
| 6 | Tap or unload the furnace | 6.1 | Identify the quantity of the required metal |
| | | 6.2 | Carry out tap rate |
| | | 6.3 | Undertake tapping or unloading safely according to procedures |
| | | | |
| 7 | Shut down furnace | 7.1 | Complete shutdown of furnace |
| | | 7.2 | Undertake routine operational maintenance of furnace in accordance with procedures |

Foundation Skills

This section describes those required skills (reading, writing, oral communication and numeracy) that are essential to workplace performance in this unit of competency.

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.

Furnaces include one (1) or more of the following:

- singular or multi
- coke

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- oil
- gas fired
- electric induction
- arc
- resistance

Operational maintenance includes one (1) or more of the following:

- routine lubrication
- cleaning
- routine repair/repointing of refractory

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM04001B Operate melting furnaces

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

Assessment Requirements for MEM04001 Operate melting furnaces

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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 on at least two (2) occasions and include:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- identifying and interpreting specifications and relevant test data sheets for furnace operation
- completing materials requisitions as required
- undertaking charge analysis and converting charge analysis to furnace charge weight and weighing the weight in accordance with procedures
- completing the start-up procedures for the applicable furnace, including completing routine operational maintenance and inspection for any:
 - defects
 - damage
 - faults
 - areas for routine repair
- starting up and charging applicable furnace whilst following emergency/safety procedures, including identifying suitable areas for emergency unloading of molten metal
- maintaining the furnace at optimum operating condition, including:
 - taking sample for chemical analysis and applying remedial action as required
 - drossing and/or degassing furnace
 - checking temperature of metal and adjusting if necessary
- undertaking tapping or unloading of furnace by identifying the quantity of required metal to SOPs
- completing shutdown and performing routine operational maintenance.

Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- safe work practices and procedures and use of personal protective equipment (PPE)
- refractory conditions, faults, and routine repair and maintenance
- condition of cooling water supply

- starting procedures for different types of furnaces
- metallic charge materials and alloying elements
- weighing procedures and scale types
- correct order of loading of different charge materials
- thermocouple condition monitoring and adjustment mechanism for furnace
- interpretation of carbon equivalent and wedge test results
- degassing procedures, including tablet, lance and other procedures
- coagulant agents, application procedures and slag removal procedures
- shutdown procedures
- applicable industry standards, national/Australian Standards, Safe Work Australia guidelines, and state/territory regulatory codes of practice/standards.

Assessment Conditions

- Assessors must:
 - have vocational competency in operating melting furnaces at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the *Standards for Registered Training Organisations 2015* or its replacement and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires
- Where possible assessment must 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 that reflects 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
- Conditions for assessment must include access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications
- 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.

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