



Australian Government

MEM48003 Monitor nonferrous melting and casting processes

Release: 1

MEM48003 Monitor nonferrous melting and casting processes

Modification History

Release 1. Supersedes and is equivalent to MSATCM303A Monitor non-ferrous melting and casting processes.

Application

This unit of competency defines the knowledge and skills required to undertake the melting and casting of nonferrous alloys.

It applies where a technician will be required to monitor a nonferrous melting and casting operation, ensuring that correct quantities are used and correct procedures followed.

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

Pre-requisite Unit

Nil

Competency Field

Metallurgy

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
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 work information
2. Identify specifications for required casting	2.1 Identify required material specifications 2.2 Identify mould requirements 2.3 Identify any special appropriate requirements
3. Verify metal charges	3.1 Select required components to give the required metal specification

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
to melting	3.2 Calculate required charge of each component 3.3 Recommend changes and/or additions to the charge 3.4 Monitor the preparation of the charge including checking for contaminants
4. Monitor furnace operation	4.1 Check that the furnace is in good operational condition and that appropriate lining is present 4.2 Identify need for maintenance and/or repairs and organise accordingly 4.3 Monitor a melt to ensure the product meets specification
5. Monitor pouring of molten metal	5.1 Check pouring is to procedures 5.2 Take required samples for analysis
6. Control hazards	6.1 Identify hazards in the metal melting and pouring process 6.2 Assess the risks arising from those hazards 6.3 Implement procedures to control those hazards in line with procedures and duty of care

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.

Moulds include:	• sand • die • investment.
Material specification includes one or more of the	• ferrous metals • ferrous alloys

following:	• contaminants.
Contaminants include one or more of the following:	• non-specified metal • rubber • grease • water • paint and non-metallics • closed containers or pipes • pressure containers including aerosols.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MSATCM303A Monitor non-ferrous melting and casting processes.

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 MEM48003 Monitor nonferrous melting and casting processes

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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:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- identifying and interpreting specifications, safety procedures and codes of practice and/or standards for the required melting and casting processes
- calculating charges
- checking for contaminants when verifying metal changes to melting on at least two occasions and recommending changes and/or additions to the charge as required
- performing visual checking of furnaces for operational condition and safety risks on at least two occasions
- taking samples on at least two occasions for analysis in accordance with work health and safety (WHS) and quality procedures.

Note: Where a volume and/or frequency is not specified, demonstration must be provided at least once.

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)
- types of moulds
- charge calculations including importance of composition control, methods used to calculate for additions and types of alloy additions
- nonferrous alloys including definitions and their physical properties, density, tensile, hardness, melting points, shrinking percentage, fluidity, brass, bronze, gunmetal, copper-based alloys, aluminium based alloys and lead
- selection including customer and manufacturer's requirements, metal analysis and Australian Standards
- types of furnaces and their maintenance including crucible, oil, gas, induction, channel, coreless, resistance and reverberatory
- refractories including silica, ganister, coatings and others common to nonferrous
- linings including monolithic, castable, rammable and bricks
- types of ladles, crucibles, safety, maintenance, care of crucibles and porous plug

- safety including housekeeping, PPE, dry area, pre-heating of ladles and overhead cranes
- furnace operation procedures including PPE, dry charge and equipment, pre-heating, scrap selection, housekeeping, melting and alloying program, charge calculations including percentages, ratio and proportion, calculations including volume and mass, operation and maintenance
- lifting and handling equipment including tongs, shanks, cranes, hoists, bogey ladles and maintenance
- types of control equipment including thermal analysis, pyrometers, gas analysis, chemical analysis, wet, dry, spectrograph, fluidity and shrinkage test
- quality control including accurate weighing, correct chemical analysis, temperature control, covers and fluxes, mould and metal reactions, thermal analysis, degassing, deoxidising and ladle refining
- types of defects including contamination, gas absorption, metal analysis, temperature control, oxidation and other defects common to nonferrous metals
- methods of avoiding and overcoming defects
- alloy production including charge, analysis, calculation, preparation and melt control
- tapping and pouring including pouring method sequence, temperature check, capacity requirements, ladle and crucibles, checks, preparation, pre-heating, transfer including safety clips, filling, metal maintenance, covers and fluxes, temperature, metal pouring, mould condition, test bar including reasons and method, pig pouring and tagging, ladle and crucible return, emptying, cleaning, maintaining, lubrication, repairs and cleaning of refractory.
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Assessment Conditions

- Assessors must:
 - have vocational competency in monitoring nonferrous melting and casting processes 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 that 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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