



**Australian Government**

# **MEM48007 Monitor and test sands, cores and moulds**

**Release: 1**

# MEM48007 Monitor and test sands, cores and moulds

## Modification History

Release 1. Supersedes and is equivalent to MSATCM402A Monitor and test sands, cores and moulds.

## Application

This unit of competency defines the knowledge and skills required to analyse mould and or core performance in terms of their design and sands used.

It applies where a technician will be required to draw conclusions as to the appropriateness of mould and/or core design and sand type chosen and make recommendations about design and selection of sands.

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)<br>1.2 Comply with work health and safety (WHS) requirements<br>1.3 Use appropriate personal protective equipment (PPE) in accordance with SOPs<br>1.4 Identify job requirements from work information |
| 2. Control hazards                               | 2.1 Identify hazards in the sand mould and/or core making process<br>2.2 Assess the risks arising from those hazards<br>2.3 Implement procedures to control those hazards in line with procedures and duty of care                                     |

| Elements                                                                 | Performance Criteria                                                                                                                                                                                                                    |
|--------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Elements describe the essential outcomes.</i>                         | <i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>                                                                                                                                  |
| 3. Select appropriate sand characteristics for job and process           | 3.1 Determine requirements of the casting<br>3.2 Identify types of sand appropriate for the type of mould or core<br>3.3 Identify types of binders appropriate for the job<br>3.4 Select sand and/or binder mix appropriate for the job |
| 4. Prepare, test and evaluate moulding sand to desired characteristics   | 4.1 Monitor preparation of bonded sand mix<br>4.2 Test materials prepared<br>4.3 Evaluate test results and report                                                                                                                       |
| 5. Evaluate finished casting for defects related to sand characteristics | 5.1 Examine casting for sand-related defects<br>5.2 Determine cause of sand-related defects<br>5.3 Recommend improvements to sand type and/or preparation                                                                               |
| 6. Report results                                                        | 6.1 Identify reporting requirements<br>6.2 Prepare report to meet requirements<br>6.3 Circulate and file report to procedures                                                                                                           |

## 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.

|                                                      |                                                                                                                                                                                             |
|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hazards include:                                     | <ul style="list-style-type: none"> <li>identification by standard techniques including safety data sheets (SDS)</li> <li>control according to the hierarchy of control and SOPs.</li> </ul> |
| Bonded materials for sand include one or more of the | <ul style="list-style-type: none"> <li>clay</li> <li>organic binders</li> </ul>                                                                                                             |

|                                                            |                                                                                                                    |
|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| following:                                                 | <ul style="list-style-type: none"><li>• inorganic binders.</li></ul>                                               |
| Sand-related defects include one or more of the following: | <ul style="list-style-type: none"><li>• wash</li><li>• expansion</li><li>• scabbing</li><li>• rat-tails.</li></ul> |

## Unit Mapping Information

Release 1. Supersedes and is equivalent to MSATCM402A Monitor and test sands, cores and moulds.

## Links

The MEM Metal and Engineering Training Package Companion Volume Implementation Guide is available from VETNet -

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

# Assessment Requirements for MEM48007 Monitor and test sands, cores and moulds

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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, assessing and controlling hazards in the sand mould and/or core making process
- taking samples in accordance with procedures on at least two occasions
- preparing standard samples
- using test equipment and evaluating test results on at least two occasions
- using and calibrating mixing machines
- examining casting for sand-related defects, determining the cause and recommending improvements to sand type and/or preparation on at least two occasions
- identifying and preparing reports to meet requirements
- circulating and filing completed report in accordance with 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)
- sources of sands and their characteristics
- green sand, resin and silicate bond and shell moulds
- relationship of moulding sand properties and characteristics to casting defects including expansion, scabbing, rat-tails and hardness
- sand grain shape and distribution, permeability, gas evolution and blow holes
- mould properties, green strength and shatter
- refractoriness and mould dilation
- definition of clay-bonded sand
- sand defects
- testing clay bonded sand including:
  - American Foundry Standard (AFS) compression sample

- moisture and clay content
- green compression and permeability
- mould hardness
- shatter index
- sieve analysis
- loss of ignition (LOI)
- AFS fineness number
- organic and inorganic bonded and core sands including:
  - drying oils including stoving and characteristics
  - cold setting oils and characteristics
  - synthetic resins, characteristics and applications
  - shell moulding
  - sodium silicate binders and characteristics
  - phenolic urethanes
  - furfuryl alcohol
  - phenolic esters
  - alkaline phenolics
  - testing hardened sands including tensile
  - compression hardness
  - choice of binder.

## Assessment Conditions

- Assessors must:
  - have vocational competency in monitoring and testing sands, cores and moulds 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.

## Links

Companion Volume implementation guides are found in VETNet -

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