



Australian Government

MEM04023 Undertake prescribed tests on foundry-related materials

Release: 1

MEM04023 Undertake prescribed tests on foundry-related materials

Modification History

Release 1. Supersedes and is equivalent to MEM04023A Undertake prescribed tests on foundry related materials

Application

This unit of competency defines the skills and knowledge required to carry out prescribed chemical analysis and mechanical (destructive) tests on foundry-related materials and compare the results against predetermined specifications. It also includes the conducting of optical emission spectroscopy (OES) testing, but not the conducting of any other tests. This work is performed under the overall direction of a metallurgist.

The foundry tradesperson may be required to draw some conclusions from the results of the specified tests regarding whether an adjustment is required within their skills and knowledge to casting or melting procedures or whether to consult on the results with a metallurgist or other authority according to standard procedures.

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: B

Unit Weight: 4

Pre-requisite Unit

MEM11011	Undertake manual handling
MEM12024	Perform computations
MEM12026	Perform advanced trade calculations in a manufacturing, engineering or related environment
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 appropriate testing procedures/standards | 2.1 Identify the need and relevant test and testing standard from prescribed range of tests and testing standards |
| | | 2.2 Arrange for external testing if appropriate |
| | | 2.3 Identify appropriate and certified laboratory and test equipment |
| | | 2.4 Select appropriate procedures/standards for the requirements of the test |
| | | 2.5 Prepare sample according to appropriate procedures |
| | | |
| 3 | Undertake prescribed tests | 3.1 Check that the sample or casting has been prepared as required by the test method |
| | | 3.2 Prepare sample or casting |
| | | 3.3 Prepare instrument as required by procedures |
| | | 3.4 Test sample or casting |
| | | 3.5 Record and check test results and repeat test results if |

Elements describe the essential outcomes.

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

4	Arrange other tests	4.1	Identify need for tests not covered by this unit
		4.2	Arrange for internal or external test according to standard enterprise procedures
5	Report result of tests	5.1	Identify reporting requirements
		5.2	Source externally conducted test results from provider
		5.3	Determine implications of test results for process or product
		5.4	Undertake or recommend actions to be taken based on test results and enterprise procedures
		5.5	Prepare and circulate report in accordance with enterprise requirements

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.

Prescribed range of tests include testing one (1) or more of the following:

- tensile strength
- compressive strength
- elongation
- area reduction
- yield stress
- yield point

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- proof stress
- Young's modulus
- elastic/plastic region and deformation
- viscoelastic deformation

Other tests include one (1) or more of the following:

- fatigue/flex testing
- creep testing
- strain test and measurement
- static shear and bend test
- ultraviolet-visible (UV-VIS) spectrophotometry
- infrared spectroscopy (IR)
- gas chromatography (GC)
- X-ray fluorescence (XRF)
- flame photometry
- atomic absorption spectrometry (AAS)
- scanning electron microscopy (SEM)

Prepare sample includes one (1) or more of the following:

- representative sub-samples have been taken
- samples are ground and milled
- the sample is ready for the test

Prepare instrument includes one (1) or more of the following:

- checking calibration
- ensuring the availability of required consumables
- curve generation where OES test is required
- setting machine conditions
- checking machine function

Materials for mechanical tests include one (1) or more of the following:

- metals
- polymer-based materials
- other solid materials on which mechanical testing is relevant

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM04023A Undertake prescribed tests on foundry related materials

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 MEM04023 Undertake prescribed tests on foundry-related materials

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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
- selecting of appropriate test methods from a prescribed range of tests against predetermined specifications and standards
- preparing samples according to appropriate procedures
- ensuring the test instrument is prepared according to specifications, standards and procedures
- conducting tests either in a workplace or suitable laboratory facility, including:
 - selecting appropriate test methods
 - obtaining repeatable results
 - interpreting test results for a foundry
 - obtaining reproducible test results from testing across different samples requiring different sample preparation/test conditions
- arranging other internal/external testing as prescribed
- preparing and circulating reports and filing report in accordance with SOPs.

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)
- standards:
 - needs for standards
 - standards organisations
 - structure and operations of Standards Australia (SA)
- the role of National Association of Testing Australia (NATA):
- tensile testing, methods for tensile testing, e.g. AS 1391-2007 Metallic materials – Tensile testing at ambient temperature or equivalent international standard, and determination of tensile properties
- general impact testing:

- factors affecting impact properties of materials, impact testing (AS 1544 Methods for impact tests on metals) or equivalent international standard and drop weight tear test (AS 1330-2004 Metallic materials – Drop weight tear test for ferritic steels) or equivalent international standard
- hardness testing:
 - Vickers hardness testing (AS 1817.1-2003 Metallic materials – Vickers hardness test – Test methods) or equivalent international standard
 - Brinell Hardness Testing (AS 1816.1-2007 Metallic materials Brinell hardness test – Test method) or equivalent international standard
 - Rockwell Hardness Testing (AS 1815.1-2007 Metallic materials – Rockwell hardness test – Test methods) or equivalent international standard
 - other hardness testing methods (e.g. Equotip and other rebound methods)
- principles of operation, uses and limitations of optical emission spectroscopy (OES) otherwise known as atomic emission spectroscopy (AES)
- purpose and scope of the following tests to the level required to determine the suitability or otherwise of the test but not to the level of conducting the test or interpreting the test:
 - fatigue/flex testing
 - creep testing
 - strain test and measurement
 - static shear and bend test
 - ultraviolet-visible (UV-VIS) spectrophotometry
 - infrared spectroscopy (IR)
 - gas chromatography (GC)
 - X-ray fluorescence (XRF)
 - flame photometry
 - atomic absorption spectrometry (AAS)
 - scanning electron microscopy (SEM)
- mathematics relevant to the collation and reporting of test data
- impact of chemical composition on the foundry process and product
- potential implications of the variety of adjustments that could be made in response to test results.

Assessment Conditions

- Assessors must:
 - have vocational competency in undertaking prescribed tests on foundry related materials 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.

Links

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