



Australian Government

Department of Education, Employment and Workplace Relations

MEM04023A Undertake prescribed tests on foundry related materials

Release: 1

MEM04023A Undertake prescribed tests on foundry related materials

Modification History

Not Applicable

Unit Descriptor

Unit descriptor	This unit of competency covers 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.
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Application of the Unit

Application of the unit	<p>This unit of competency applies to a foundry tradesperson who is required to select and conduct an appropriate chemical, mechanical or OES test from a prescribed range of possible tests. Tests are conducted on samples of materials commonly used in foundries with results being compared against specifications for the material or product. The foundry tradesperson may be required to draw some conclusions from the results of the specified tests in regard to 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. Work would be conducted under the general supervision of a metallurgist.</p> <p>Band: B</p> <p>Unit Weight: 4</p>
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Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units		
Path 1	MEM30012A	Apply mathematical techniques in a manufacturing engineering or related environment

Employability Skills Information

Employability skills	This unit contains employability skills.
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Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.	Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.
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Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Select appropriate testing procedures/standards	1.1. Identify the need (or otherwise) for testing 1.2. Identify the relevant test and testing standard from prescribed range of tests and testing standards 1.3. Arrange for external testing if appropriate 1.4. Identify appropriate and certified laboratory/test equipment 1.5. Select appropriate procedures/standards for the requirements of the test 1.6. Prepare sample according to appropriate procedures
2. Undertake prescribed tests	2.1. Check that sample or casting has been prepared as required by test method 2.2. Prepare sample or casting 2.3. Prepare instrument as required by procedures 2.4. Test sample or casting 2.5. Record and check test results 2.6. Repeat test results if required
3. Arrange other tests	3.1. Identify need for test 3.2. Arrange for internal or external test according to standard enterprise procedures
4. Report result of tests	4.1. Identify reporting requirements 4.2. Source externally conducted test results from provider 4.3. Determine implications of test results for process or product 4.4. Undertake or recommend actions to be taken based on test results and enterprise procedures 4.5. Prepare and circulate report in accordance with enterprise requirements

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

REQUIRED SKILLS AND KNOWLEDGE

Required skills

Required skills include:

- analysing data
- selecting and setting up appropriate tests
- solving problems
- performing tests
- interpreting results
- reporting results

Required knowledge

Required knowledge includes:

- standards:
 - needs for standards
 - standards organisations
 - structure and operations of Standards Australia (SA)
- role of National Association of Testing Australia (NATA):
 - tensile testing
 - methods for tensile testing e.g. AS 1391 or equivalent international standard
 - determination of tensile properties
- general impact testing:
 - factors affecting impact properties of materials
 - impact testing (AS 1544) or equivalent international standard
 - dropweight tear test (AS 1330) or equivalent international standard
- hardness testing:
 - Vickers Hardness Testing (AS 1817, Part 1) or equivalent international standard
 - Brinell Hardness Testing (AS 1816, Part 1) or equivalent international standard
 - Rockwell Hardness Testing (AS 1815, Part1) or equivalent international standard
 - other hardness testing methods (e.g. Equotip and other rebound methods)
- the principles of operation, uses and limitations of optical emission spectroscopy (OES) otherwise known as atomic emission spectroscopy (AES)
- the 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

REQUIRED SKILLS AND KNOWLEDGE

- 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
- the impact of chemical composition on the foundry process and product
- the potential implications of the variety of adjustments that could be made in response to test results

Evidence Guide

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.

Overview of assessment

This competency requires evidence of competency in the selection of appropriate test methods from a prescribed range of tests for various scenarios and the interpretation of test results against predetermined specifications and standards. The scenarios, materials and test results should be relevant to the foundry industry and may be drawn directly from the workplace or may be simulated case studies.

Tests may be conducted in either a workplace or suitable laboratory facility.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

Assessors should ensure that candidates can competently and consistently:

- select appropriate test methods
- obtain repeatable results
- interpret test results for a foundry
- successfully complete several scenarios requiring the selection of different tests
- obtain reproducible test results from testing across different samples requiring different sample preparation/test conditions.

Context of and specific resources for assessment

Assessment may occur on the job or in an appropriately simulated environment. Access is required to real or appropriately simulated situations, including work areas, materials and equipment, and to information on workplace practices and OHS practices.

Where applicable, reasonable adjustment must be made to work environments and training situations to accommodate ethnicity, age, gender, demographics and disability.

Access must be provided to appropriate learning and/or assessment support when required. Where applicable, physical resources should include equipment modified for people with disabilities.

Method of assessment

Assessment must satisfy the endorsed assessment guidelines of the MEM05 Metal and Engineering

EVIDENCE GUIDE

	<p>Training Package.</p> <p>Assessment methods must confirm consistency and accuracy of performance (over time and in a range of workplace relevant contexts) together with application of underpinning knowledge.</p> <p>Assessment methods must be by direct observation of tasks and include questioning on underpinning knowledge to ensure its correct interpretation and application.</p> <p>Assessment may be applied under project related conditions (real or simulated) and require evidence of process.</p> <p>Assessment must confirm a reasonable inference that competency is able not only to be satisfied under the particular circumstance, but is able to be transferred to other circumstances.</p> <p>Assessment may be in conjunction with assessment of other units of competency where required.</p>
Guidance information for assessment	Assessment processes and techniques must be culturally appropriate and appropriate to the language and literacy capacity of the candidate and the work being performed.

Range Statement**RANGE STATEMENT**

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Standards and industry codes of practice	Where reference is made to industry codes of practice and/or Australian/international standards, it is expected that the latest version will be used
Prescribed range of tests	Prescribed range of tests means tests that may be conducted by the foundry tradesperson and where the need for the test has been determined by a

RANGE STATEMENT	
	<p>metallurgist or other authority according to the procedures of the enterprise and the requirements for the casting and mould materials being used and the product being cast. The prescribed range of tests may include:</p> <ul style="list-style-type: none"> • OES • tensile/compression testing which may include testing for tensile strength, compressive strength, elongation, reduction of area, yield stress, yield point, proof stress, Young's modulus, elastic/plastic region and deformation or viscoelastic deformation • hardness testing - Vickers, Brinell, Rockwell and Durometer tests • impact testing including Izod, Charpy and Dropweight Tear
Other tests	<p>Other tests include</p> <ul style="list-style-type: none"> • fatigue/flex testing • creep testing • strain test and measurement • static shear and bend test • 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	<p>Prepare sample means that:</p> <ul style="list-style-type: none"> • representative sub-samples have been taken • samples are ground and milled • the sample is ready for the test
Prepare instrument	<p>Prepare instrument includes:</p> <ul style="list-style-type: none"> • checking calibration • ensuring the availability of required consumables • curve generation where OES test is required • setting machine conditions • checking machine function

RANGE STATEMENT

Materials	Materials for mechanical tests include metals, polymer based materials and other solid materials on which mechanical testing is relevant
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Unit Sector(s)

Unit sector	
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Co-requisite units

Co-requisite units		

Competency field

Competency field	Casting and moulding
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