



Australian Government

MEM48006 Prepare and examine metallographic samples

Release: 1

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Modification History

Release 1. Supersedes and is equivalent to MSATCM401A Prepare and examine metallographic samples.

Application

This unit of competency defines the knowledge and skills required to prepare and examine a metallographic sample.

It applies where a technician will be required to examine samples as part of quality control, product development or problem solving/forensic investigation. This unit covers the preparation of relevant samples and then the microscopic and other examination of such samples.

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

Pre-requisite Unit

MEM48004 Interpret basic binary phase diagrams

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. Prepare chemical etchants for use with metallographic samples	2.1 Identify the hazards of the required chemical etchants and apply hazard controls 2.2 Prepare etchant solution from bulk stocks following hazard controls and good laboratory practice

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
	2.3 Label and store etchants to standard 2.4 Standardise and check etchants in accordance with procedures
3. Prepare sample for metallographic examination	3.1 Undertake mechanical sample preparation 3.2 Label or otherwise identify sample to procedure 3.3 Select etchant(s) appropriate to the metal and the examination 3.4 Etch and prepare metal surface to standard 3.5 Protect prepared surface
4. Undertake microscopic examination of sample	4.1 Set up microscope using appropriate fittings and magnifications 4.2 Examine and identify different metallic and non-metallic phases 4.3 Identify areas requiring further examination and/or photomicrographs
5. Prepare photomicrographs	5.1 Set up equipment and materials for photomicrograph 5.2 Adjust photomicrograph equipment, including bright and dark field illumination 5.3 Take photomicrograph and make required edits and enhancements to meet requirements 5.4 Process and record photomicrograph to procedures
6. Report result of examination	6.1 Identify reporting requirements 6.2 Make reference to relevant national and/or international standards 6.3 Prepare report to meet requirements 6.4 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:	• identification by standard techniques including safety data sheets (SDS) • control according to the hierarchy of control and SOPs.
Etchants include:	• all common etchants including strong acid solutions.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MSATCM401A Prepare and examine metallographic samples.

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 MEM48006 Prepare and examine metallographic samples

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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
- nominating the appropriate cutting process and the appropriate directionality of the sample plane for examination on at least two occasions
- mixing and/or preparing etchant solutions according to safety data sheets (SDS) and standard operating procedures (SOPs)
- mixing and/or preparing mounting resins
- basic cutting, grinding and polishing of samples including mechanical and electrolytic polishing on at least two occasions
- etching of samples
- using a microscope to identify microstructures on at least two occasions, including metallic and non-metallic features
- prepare photomicrographs in accordance with work requirements
- 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)
- metallographic examinations
- mechanical sample preparations
- understanding of microstructures of metals
- chemical applications and safety including SDS and potential hazards
- composition and suitability of etchants
- processing and recording of photomicrographs
- relevant Australian or international standards.

Assessment Conditions

- Assessors must:
 - have vocational competency in preparing and examining metallographic samples 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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