



Australian Government

Department of Education, Employment and Workplace Relations

MSATCM401A Prepare and examine metallographic samples

Revision Number: 1

MSATCM401A Prepare and examine metallographic samples

Modification History

Not applicable.

Unit Descriptor

Unit Descriptor	This unit covers the knowledge and skills needed to prepare and examine a metallographic sample.
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Application of the Unit

Application of the unit	In a typical scenario, a metallurgical 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.
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Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Pre-requisite Units	<i>MSATCM304A</i>	<i>Interpret basic binary phase diagrams</i>

Employability Skills Information

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

Not applicable.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Prepare chemical etchants for use with metallographic samples	1.1. Identify the hazards of the required chemical etchants and apply hazard controls 1.2. Prepare etchant solution from bulk stocks following hazard controls and good laboratory practice 1.3. Label and store etchants to standard 1.4. Standardise/check etchants as required by procedures.
2. Prepare sample for metallographic examination	2.1. Undertake mechanical sample preparation 2.2. Label/identify sample to procedure 2.3. Select etchant(s) appropriate to the metal and the examination 2.4. Etch/prepare metal surface to standard 2.5. Protect prepared surface
3. Undertake microscopic examination of sample.	3.1. Set up microscope using appropriate fittings and magnifications 3.2. Examine and identify different metallic and non-metallic phases 3.3. Identify areas requiring further examination and/or photomicrographs
4. Prepare photomicrographs	4.1. Set up equipment and materials for photomicrograph 4.2. Adjust photomicrograph equipment, including bright and dark field illumination 4.3. Take photomicrograph 4.4. Process and record photomicrograph
5. Report result of examination	5.1. Identify reporting requirements 5.2. Make reference to appropriate national or international standards as required 5.3. Prepare report to meet requirements 5.4. Circulate and file report to procedures.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required skills:

- nominating the appropriate cutting process
- nominating the appropriate directionality of the sample plane for examination
- mixing/preparing etchant solutions according to MSDS and standard operating procedure (SOP)
- mixing/preparing mounting resins
- basic cutting, grinding and polishing of samples including mechanical and electrolytic polishing
- etching of samples
- use of microscope
- identify microstructures, including metallic and non-metallic features

Required knowledge:

Competency includes sufficient knowledge of:

- understanding of microstructures of metals
- chemical applications and safety including material safety data sheets (MSDS)
- composition and suitability of etchants
- knowledge of relevant standards (for example AS 1831 or equivalent international standard)

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, the Range Statement and the Assessment Guidelines for the Training Package.

Overview of assessment

A person who demonstrates competency in this unit must be able to prepare and examine metallographic samples. Critical aspects for assessment and evidence are required to demonstrate competency in this unit.

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

It is essential that competence is demonstrated in the ability to:

- Prepare and examine samples. Evidence should be provided from a number of sample preparations and examinations, covering the use of different etchants, preparation methods and examinations. The reports prepared should be a major part of this evidence, but will need supplementing to demonstrate the validity of this evidence.

Relationship to other units

This unit may be assessed concurrently with other relevant units.

Assessment method and context

Assessors must be satisfied that the person can consistently perform the unit as a whole, as defined by the elements, performance criteria, skills and knowledge. A holistic approach should be taken to the assessment.

Assessors should gather sufficient, fair, valid, reliable, authentic and current evidence from a range of sources. Sources of evidence may include direct observation, reports from supervisors, peers and colleagues, project work, samples, organisation records and questioning. Assessment should not require language, literacy or numeracy skills beyond those required for the unit.

The assessee will have access to all techniques, procedures, information, resources and aids which would normally be available in the workplace.

The method of assessment should be discussed and agreed with the assessee prior to the

EVIDENCE GUIDE**Resource implications**

This section should be read in conjunction with the range of variables for this unit of competency. Resources required include suitable access to an organisation where metallographic sample preparation and examination is undertaken. A bank of case studies/scenarios and questions will also be required to the extent that they form part of the assessment method. Questioning may take place either in the workplace, or in an adjacent, quiet facility such as an office or lunchroom. No other special resources are required.

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.

Codes of practice/standards	Where reference is made to industry codes of practice, and/or Australian/international standards, it is expected the latest version will be used.
Hazards	Hazards to be identified by standard techniques such as Material Safety Data Sheets (MSDS) and controlled according to the hierarchy of control and SOP.
Etchants	Etchants includes all common etchants such as strong acid solutions.
Metallographic examination	Metallographic examination includes microscopy, photomicrographs and other standard techniques.
Mechanical sample preparation	Mechanical sample preparation includes cutting (eg to size/shape), mounting, grinding (e.g. to prepare flat surface) and polishing (e.g. on a lap) as required.
Process and record	Processing and recording of photomicrographs includes editing and enhancing of photographs and identification and filing using an appropriate procedure.

Unit Sector(s)

Unit Sector	Metallurgy
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Competency field

Competency Field	
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Co-requisite units

Co-requisite Units		