



Australian Government

MEM48004 Interpret basic binary phase diagrams

Release: 1

MEM48004 Interpret basic binary phase diagrams

Modification History

Release 1. Supersedes and is equivalent to MSATCM304A Interpret basic binary phase diagrams.

Application

This unit of competency defines the knowledge and skills required to interpret phase diagrams and so predict the microstructures of binary alloys.

It applies to the interpretation of cooling phase diagrams as used in metallurgy. The application will primarily be to phase diagrams of metals and alloys showing temperature and composition variables.

It applies where a technician will be required to recommend a phase transition process in order to obtain a required microstructure, or to predict a microstructure from a known phase transition process.

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

Unit Weight: 4

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) 1.2 Comply with work health and safety (WHS) requirements at all times 1.3 Identify job requirements from work information
2. Identify the microstructures from an equilibrium cooling	2.1 Obtain phase diagram for metal or alloy from internal or external sources

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
phase diagram	2.2 Identify number, composition, proportion and structural arrangement of phases in binary alloys 2.3 Identify structural changes due to varying proportion of alloying elements and temperature 2.4 Identify the phase changes and final microstructures of binary alloys cooled under equilibrium conditions from the melt or during heat treatment operations
3. Identify the microstructures from a non-equilibrium cooling phase diagram	3.1 Identify number, composition, proportion and structural arrangement of phases in binary alloys 3.2 Identify structural changes due to varying proportion of alloying elements and temperature 3.3 Identify the phase changes and final microstructures of binary alloys cooled under equilibrium conditions from the melt or during heat treatment operations
4. Recognise characteristic microstructures of binary alloys	4.1 Recognise characteristic structures of dendrites (homogeneous and cored) columnar and equiaxed grains 4.2 Recognise characteristic structures resulting from eutectic, eutectoid and peritectic reactions 4.3 Recognise characteristic structures resulting from solid state precipitation

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.

Scientific techniques and principles of cooling phase	• equilibrium phase diagrams • non-equilibrium phase diagrams
---	--

diagrams relate to one or more of the following:	• effect of temperature and alloying elements on structural changes • structures of homogenous and cored dendrites • structures of columnar and equiaxed grains • eutectic, eutectoid and peritectic reactions.
--	---

Unit Mapping Information

Release 1. Supersedes and is equivalent to MSATCM304A Interpret basic binary phase diagrams.

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 MEM48004 Interpret basic binary phase diagrams

Modification History

Release 1. Supersedes and is equivalent to MSATCM304A Interpret basic binary phase diagrams.

Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance and include:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- identifying and interpreting the microstructures from an equilibrium and non-equilibrium cooling phase diagrams criteria on at least two occasions
- producing a basic cooling phase diagram from supplied data criteria on at least two occasions
- estimating composition from the structure of a phase diagram
- predicting structure from the composition from a phase diagram.

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
- scientific techniques and principles of cooling phase diagrams
- methods of construction of phase diagrams for binary alloys
- phase changes that occur in binary alloy systems as recorded by the appropriate phase diagrams
- equilibrium and non-equilibrium cooling of binary alloys and the resulting microstructures in cast and heat-treated material.
-

Assessment Conditions

- Assessors must:
 - have vocational competency in interpreting basic binary phase diagrams 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>