



Australian Government

MEM24012 Apply metallurgical principles

Release: 1

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Modification History

Release 1. Supersedes and is equivalent to MEM24012C Apply metallurgy principles.

Application

This unit of competency defines the skills and knowledge required to apply basic metallurgical principles to the selection of appropriate non-destructive testing (NDT) techniques and interpretation of the results of NDT tests for metallurgical processes.

It applies to knowledge of metallurgical principles, and the relationship between the various non-destructive testing methods and their capabilities and limitations when applied to the detection of specific discontinuities in metals and alloys.

The unit applies to employees who select and order NDT tests and who interpret results provided by tests for metal manufacturing, casting, shaping, and joining processes. It does not involve conduct of NDT tests.

Where materials and chemicals which are subject to codes and regulations are stored and used - for example, chemicals, explosives, solvents, dangerous materials, acids, or noxious waste products - safe work habits must be considered.

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

Band: B

Unit Weight: 4

Pre-requisite Unit

MEM13015 Work safely and effectively in manufacturing and engineering

MEM16006 Organise and communicate information

Competency Field

Non-destructive testing

Unit Sector

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>

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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 specifications
2. Interpret and apply the principles of solidification and crystal structures and equilibrium diagrams in metals and alloys	2.1 Interpret principles of solidification and crystal structures in metals and alloys and apply in relation to NDT techniques 2.2 Source and interpret equilibrium diagrams for metals and alloys
3. Interpret and apply the principles for fusion welding of metals and alloys	3.1 Apply principles and methods for fusion welding of metals and alloys to NDT test selection 3.2 Identify defects in weldments and classify from NDT test results
4. Interpret and apply the principles of the formation of castings	4.1 Apply principles and methods used to produce metal castings to NDT test selection 4.2 Identify defects in metal and alloy castings and classify from NDT test results
5. Interpret and apply the principles of steel forging	5.1 Apply principles and methods used to produce steel forgings to NDT test selection 5.2 Identify defects in steel forgings and classify from NDT test results
6. Interpret and apply the principles of mechanical testing	6.1 Apply principles of mechanical testing to NDT test selection 6.2 Identify defects in metal product and classify from NDT test results

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.

Principles and methods for fusion welding of metals and alloys include:	• manual metal arc welding (MMAW) • submerged arc welding (SAW) • gas metal arc welding (GMAW) • gas tungsten arc welding (GTAW) • flux core arc welding (FCAW).
Defects in weldments include:	• cracks • lack of fusion • cavities • imperfect shape • solid inclusions • miscellaneous.
Defects in metal and alloy castings include:	• shrinkage cavities • hot tears • cold cracks • gas holes.
Principles and methods used to produce steel forgings include:	• deformations • strengthening mechanisms • annealing.
Principles of mechanical testing include:	• impact • tensile • hardness testing.

Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM24012C Apply metallurgy principles.

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>