



Australian Government

MEM24024 Undertake magnetic particle tests

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Modification History

Release	Comments
1	This unit of competency was first released in MEM Manufacturing and Engineering Release 5.0.

Application

This unit of competency defines the skills and knowledge required to undertake magnetic particle testing in a range of industrial applications. Personnel are required to select the most appropriate magnetic particle test techniques and test equipment for a specific material or application; interpret the test data; detect and classify defects using relevant standards; and report the results.

Magnetic particle tests are performed on critical components or structural zones. Personnel are required to consider actual and potential defects as well as ongoing abnormalities in fabrications, components, structures and/or aircraft components.

This unit of competency applies to engineering technicians and non-destructive testing (NDT) technicians who are performing penetrant tests as defined in Australian and international codes and standards working in manufacturing, engineering aerospace and associated industry sectors. These employees work under the general supervision of personnel such as engineering associates, NDT technicians aligned to level 3 in technical standards; professional engineers and scientists; engineering technologists; and production, operations and maintenance managers.

Where reading and interpretation of technical drawings is required unit MEM09229 Read and interpret technical drawings should also be selected.

Where the selection and use of engineering measurement is required unit MEM12023 Perform engineering measurements should also be selected.

Where the selection and use of hand tools are required unit MEM18001 Use hand tools should also be selected.

Where the selection and use of power tools are required unit MEM18002 Use power tools/hand held operations should also be selected.

Where the application of materials technology principles is required unit MEM24039 Apply materials technology principles to non-destructive tests to should also be selected.

Band: B

Unit Weight: 4

Licensing/Regulatory Information

Assessment as competent against MEM24024 Undertake magnetic particle tests may contribute to certification against Australian NDT standards where assessment of this unit of

competency is carried out in conjunction with an examining authority as described in AS ISO 9712 NDT – Qualification and certification of personnel or subsequent Standards.

Pre-requisite unit(s)

MEM13015 Work safely and effectively in manufacturing and engineering

MEM16006 Organise and communicate information

Competency field(s)

Non-destructive testing

Unit sector(s)

N/A

Elements and Performance Criteria

Elements	Performance criteria
Elements describe the essential outcomes.	Performance criteria describe the performance needed to demonstrate achievement of the element.
1. Establish job requirements	1.1 Comply with relevant WHS and regulatory requirements, codes of practice, and standards for magnetic particle testing 1.2 Identify job requirements from specifications, drawings, job sheets, previous NDT results or work instructions
2. Prepare for testing	2.1 Liaise with client to explain testing requirements and schedule tests 2.2 Use established safe work practices and personal protective equipment (PPE) in accordance with SOPs 2.3 Assemble all specified testing equipment, materials and containers and safety equipment 2.4 Identify inspection areas and determine if special access requirements appropriate for the NDT test need to be communicated to the client 2.5 Clean and prepare inspection areas for testing using appropriate test procedures and materials 2.6 Assess inspection areas visually and identify obvious discontinuities
3. Conduct magnetic particle tests	3.1 Select the most appropriate magnetic particle test technique for the material or application

	3.2 Select test equipment and conduct pre-use checks in accordance with relevant standards and/or procedures 3.3 Select and apply appropriate test media in accordance with workplace/industry practices 3.4 Conduct magnetic particle tests in accordance with relevant standards and work instructions 3.5 De-magnetise material according to specification 3.6 Minimise environmental impacts of testing and generation of waste 3.7 Record any site observations that may affect results
4. Interpret and report results of magnetic particle tests	4.1 Review conduct of the test and confirm test procedures were applied correctly 4.2 Monitor and assess indications and determine the type of discontinuity for each relevant indication 4.3 Apply acceptance criteria to discontinuities to detect defects 4.4 Classify defects in accordance with relevant national and international codes and standards 4.5 Confirm defects in accordance with workplace procedures and industry practices 4.6 Seek advice for problems outside technical competence or knowledge 4.7 Record and classify test results 4.8 Report test results and complete all job records in accordance with relevant standards, workplace procedures or accepted industry practices and customer service requirements
5. Maintain a safe work environment	5.1 Restore test site, clean inspection area and equipment and dispose of all waste in accordance with enterprise procedures 5.2 Store and maintain magnetic particle testing equipment in accordance with standard operating procedures and WHS requirements

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.	
Preparation processes include one (1) or more of the following:	• surface cleaning • drying.
Magnetic media include one (1) or more of the following:	• dry magnetic powders such as iron oxide • wet magnetic powders and their carrier fluids colour contrast or fluorescent dyes, hydrocarbons, water and aerosol carriers.
Magnetic particle test equipment includes one (1) or more of the following:	• simple pole magnets • yokes, AC/DC bridges • bench units.

Unit Mapping Information

Current Code and Title	Previous Code and Title	Comments	Equivalence
MEM24024 Undertake magnetic particle tests	MEM24004 Perform magnetic particle testing	Superseded	Equivalent

Assessment Requirements for MEM24024 Undertake magnetic particle tests

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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 on at least two (2) occasions. Each specimen tested shall be different in character, i.e. in product form, material specification, shape, size, or discontinuity type and be representative of products typically tested in the industrial sector.

Evidence required includes:

- preparing the inspection area for testing and identifying discontinuities
- complying with workplace procedures and WHS requirements at all times during magnetic particle testing
- identifying and interpreting specifications, standards, drawings, charts, lists and other reference material for performing magnetic particle testing on at least two specimens
- selecting the most appropriate magnetic particle test technique for the material or application
- applying test media and undertaking magnetic particle testing using appropriate techniques for the specimen materials
- checking/confirming indicators and identifying all defects including accurate identification of location and size of discontinuities and defects.
- classifying all defects in accordance with national and international codes and standards
- performing accurate calculations relevant to magnetic particle testing
- reporting test results in accordance with workplace procedures and customer service requirements
- performing de-magnetisation
- conducting testing with minimal environmental impact.

Note: Different specimens means different in character, i.e. in product form, material specification, shape, size, or discontinuity type and be representative of products typically tested in the industrial sector.

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:

- principles, applications, advantages and limitations of magnetic particle testing
- requirements of any applicable standards, Safe Work Australia guidelines, State/Territory regulatory codes of practice/standards relevant to magnetic particle testing
- types of magnetism including:
 - magnetic properties, materials and circuits
 - relative permeability of common engineering materials
 - magnetic discontinuity, leakage fields
- nature and properties of various types of magnetising current
- magnetic particle testing techniques and procedures for a range of applications relevant to job role
- cleaning and preparation processes and procedures and associated WHS requirements
- preparation of parts
- effect of surface coatings on sensitivity and surface roughness
- dressing of welds
- media types including the advantages and limitations of dry powders and fluid suspensions
- quality control of media, viewing conditions
- established assessment procedures and techniques
- types of equipment and their features such as: portable, stationary and automated
- system verification checks necessary to carry out magnetic particle test
- lighting conditions
- use of magnification
- factors influencing appearance, interpretation of indications
- common defects, spurious indications and false indications, surface and sub-surface indications
- types of discontinuities and their consequences
- standard recording and reporting formats and procedures for reporting test results, job records, routine reports
- basic maintenance and storage procedures for test equipment
- de-magnetisation requirements
- procedures for waste disposal and care for environment

- relevant hazards, health, safety and environment requirements relevant to job role including WHS regulations, safe work procedures and use of Personal Protective Equipment (PPE).

Assessment Conditions

- Assessors must:
 - have vocational competency in undertaking magnetic particle tests at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the current vocational education and training legislation, frameworks and/or standards.
- 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.

Link

Companion volumes, including implementation guides, are found on the national training register - <https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=45a7f1d5-61a5-447a-9688-7abbd7e1a5c7>.