



Australian Government

MEM24026 Undertake eddy current 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 eddy current testing in a range of industrial applications. Personnel are required to select the most appropriate eddy current 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.

Eddy current 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 eddy current 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, 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 should also be selected.

Band: B

Unit Weight: 6

Licensing/Regulatory Information

Assessment as competent against MEM24026 Undertake eddy current 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 eddy current 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 to ensure personal safety and that of others 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 eddy current tests	3.1 Select the most appropriate eddy current test technique for the material or application using relevant standards and/or procedures

	3.2 Select test equipment and conduct pre-use checks in accordance with relevant standards and/or procedures 3.3 Optimise test set up by calculating effects such as probe dimensions, frequency and phase of induced field and material conductivity on eddy current penetration 3.4 Conduct eddy current tests in accordance with relevant standards, work instructions and WHS requirements 3.5 Minimise environmental impacts of testing and generation of waste 3.6 Record any site observations that may affect results
4. Interpret and report results of eddy current 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 Report test results and complete all job records in accordance with relevant standards and SOPs
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 eddy current 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.
Eddy current test applications include one (1) or more of the following:	• detection of surface and subsurface cracks, corrosion, stress corrosion cracking, metal fatigue • detection of manufacturing defects • deformation in non-ferrous/ferrous alloys steels • detection of heat damage • material sorting • tube testing • coating thickness measurement • weld inspection • wheel bead seat testing • conductivity measurements.
Eddy current test equipment includes one (1) or more of the following:	• surface probes such as pencil probes, encircling coils, ID probes, absolute probes, differential probes, reflection probes • coating thickness meters • crack detectors • impedance plane displays.

Unit Mapping Information

Current Code and Title	Previous Code and Title	Comments	Equivalence
MEM24026 Undertake eddy current tests	MEM24006 Perform eddy current testing	Superseded	Equivalent

Assessment Requirements for MEM24026 Undertake eddy current 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. 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.

Evidence required includes:

- preparing the inspection area on at least two specimens for testing and identifying discontinuities
- complying with workplace procedures and WHS requirements at all times during eddy current testing
- identifying and interpreting specifications, standards, drawings, charts, lists and other reference material for performing eddy current testing on at least two specimens
- selecting the most appropriate eddy current test technique for the material or application for at least two specimens
- optimising equipment set-up for at least two specimens
- undertaking eddy current testing using appropriate techniques for the specimen materials to be tested
- checking/confirming indicators and identifying all defects for at least two specimens
- classifying all defects for at least two specimens in accordance with national and international codes and standards
- performing accurate calculations relevant to eddy current testing
- reporting test results for at least two specimens in accordance with workplace procedures and customer service requirements
- conducting testing with minimal environmental impact.

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:

- basic principles of electricity, magnetism, electromagnetism including:
 - reactance - field made by eddy current
 - Biot and Savant law - definition, practical (right hand) rules
 - Amperes law - definition, applications (toroid, infinite coil, flat coil)
 - Lenz law - definition, auto-induction factor, mutual induction factor, coupling factor
 - induced currents - short circuit coil, metallic mass, skin effect and reactance
 - electrical conductivity and magnetic permeability
- applications and limitations of eddy current testing
- requirements of any applicable standards, national/Australian standards, Safe Work Australia guidelines, State/Territory regulatory codes of practice/standards relevant to eddy current testing
- scope and principles of eddy current testing performed in job role
- types of eddy current test equipment, their operation and controls including transmission, reception and data presentation
- characteristics of eddy current probes
- physical properties of materials under test, structure and geometry of test part, cylindrical bars, tubes
- influence of various parameters on eddy current measurement
- compensation for conductive and non-conductive coatings
- coupling influence and relative speed
- cleaning and preparation processes, procedures and WH&S requirements in relation to the preparation process
- procedures, tools, equipment, techniques and system verification checks necessary to carry out eddy current testing
- established assessment procedures and techniques
- types of discontinuities and their consequences
- geometric defect characterisation
- multiple defects and defect position and orientation
- standard recording and reporting formats and procedures for reporting test results
- basic maintenance and storage procedures for testing equipment

- 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 eddy current 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>.