



Australian Government

MEM24043 Undertake ultrasonic thickness 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 ultrasonic thickness tests to accurately measure the dimensions of components, coatings, or internal features which cannot be readily measured by other means. Test purposes include detection of wear, corrosion and loss of thickness as part of maintenance and condition monitoring and the identification of possible abnormalities such as inclusions. Personnel are required to follow written or verbal test instructions and use specified test equipment/materials.

Ultrasonic thickness tests are performed on critical components or structural zones. Personnel are required to consider actual and potential defects together with ongoing abnormalities. This unit does not cover the choice of ultrasonic thickness test method/technique or the interpretation of results.

This unit of competency applies to non-destructive testing (NDT) technicians who are performing ultrasonic thickness tests as defined in Australian and international codes and standards working in manufacturing, engineering, aerospace, and associated industry sectors. The work is performed under the supervision of NDT technicians recognised as competent in higher levels of NDT ultrasonic testing 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.

Licensing/Regulatory Information

Assessment as competent against MEM24043 Undertake ultrasonic thickness tests may contribute to certification against the Australian NDT standards where the assessment 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. Determine job requirements	1.1 Comply with relevant WHS and regulatory requirements, codes of practice, standards, and standard operating procedures for ultrasonic thickness testing 1.2 Use appropriate personal protective equipment (PPE) in accordance with SOPs 1.3 Identify job requirements from specifications
2. Prepare for testing	2.1 Assemble all specified testing equipment, materials and containers and safety equipment 2.2 Identify inspection area and determine if special access requirements are required 2.3 Clean and prepare inspection areas for testing using appropriate test procedures and materials 2.4 Assess inspection areas visually to identify obvious discontinuities and faults
3. Conduct ultrasonic thickness tests	3.1 Use the test technique specified in work instructions or standard operating procedures (SOPs) 3.2 Conduct system verification checks and operate thickness gauge in accordance with manufacturers' specifications and work instructions 3.3 Use appropriate calibration blocks to calibrate the gauge for the expected thickness range in the material being tested

	3.4 Record thickness data and any relevant observations about the signal waveform, test piece and/or site conditions 3.5 Review conduct of the test and confirm test procedures were applied correctly 3.6 Recognise thickness results that indicate possible discontinuities and faults 3.7 Perform additional measurements to determine the extent of possible abnormalities
4. Report the results of ultrasonic thickness tests	4.1 Confirm thickness results and presence of possible abnormalities for test pieces in accordance with relevant standards and SOPs 4.2 Seek advice for problems outside technical competence or knowledge 4.3 Report test results and relevant observations and complete all job records in accordance with relevant standards and SOPs
5. Maintain a safe work environment	5.1 Use established safe work practices and personal protective equipment to ensure personal safety and that of others 5.2 Minimise environmental impacts of testing and generation of waste 5.3 Restore test site, clean inspection area and equipment and dispose of all waste in accordance with enterprise procedures 5.4 Store and maintain ultrasonic thickness 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.

Ultrasonic test equipment includes one

- contact, delay-line and immersion transducers
- corrosion and precision gauges

(1) or more of the following:	• D meters, a-scan D meter, analog a-scan, digital a-scan.
Material abnormalities include one (1) or more of the following:	• corrosion • wear • inclusions.

Unit Mapping Information

Current Code and Title	Previous Code and Title	Comments	Equivalence
MEM24043 Undertake ultrasonic thickness tests		This unit has been created to address a skill or task required by industry that is not covered by an existing unit of competency	Newly created

Assessment Requirements for MEM24043 Undertake ultrasonic thickness 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 three (3) 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 WHS requirements during ultrasonic thickness testing
- undertaking ultrasonic thickness testing using at least three of the following techniques once:
 - single spot measurement
 - single spot double measurement
 - double spot measurement
 - multiple spot measurement
 - close grid survey
 - open grid survey
 - scanning runs
 - complete coverage method
- following work instructions and SOPs for performing ultrasonic thickness testing and applying relevant standards and specifications
- setting up an ultrasonic thickness gauge and calibrating it for the type of material and expected thickness range
- confirming:
 - basic thickness results
 - the presence of wear
 - corrosion

- loss of thickness
 - possible abnormalities in test pieces
- reporting test results using standard workplace forms
- conducting testing with minimal environmental impact.

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 concepts of frequency, velocity, wavelength, amplitude
- generation of ultrasound, properties and behaviour of ultrasound
- basic principles of ultrasonic thickness testing; advantages and limitations
- requirements of national/Australian standards, Safe Work Australia guidelines, State/Territory regulatory codes of practice/standards relevant to ultrasonic thickness testing
- procedures, tools, equipment, techniques and system verification checks necessary to conduct ultrasonic thickness tests
- types of ultrasonic thickness testing equipment
- types of displays including a-scan display and b-scan display
- types of couplants and their characteristics
- cleaning and preparation processes, procedures and WHS requirements for a variety of test surfaces
- straight beam testing method including:
 - calibration of thickness testing equipment
 - frequency
 - probe size and shape
 - thickness testing
- types of discontinuities and abnormalities indicated by ultrasonic thickness testing and their possible test piece consequences including:
 - corrosion
 - loss of thickness
 - possible abnormalities such as inclusions in the test piece
 - wear and other common defects
- common variables affecting test results such as:
 - test piece size, geometry, surface roughness
 - material type and sound attenuation

- distance location from entry surface, orientation to entry surface
 - reflecting characteristics of back wall
 - thickness range
- standard recording and reporting formats and procedures for reporting test results
- basic maintenance and storage procedures for ultrasonic 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 ultrasonic thickness 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>.