



Australian Government

MEM24028 Undertake ultrasonic 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 tests to detect and evaluate material separations and inclusions in a range of industrial applications. Personnel are required to select the most appropriate ultrasonic test techniques and equipment for a specific material or application; calibrate and optimise the instrument; interpret and evaluate the test data; detect and classify defects using relevant standards; and report the results.

Ultrasonic 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 ultrasonic tests as defined in Australian and international codes and standards working in manufacturing or 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 should also be selected.

Band: B

Unit Weight: 6

Licensing/Regulatory Information

Assessment as competent against MEM24028 Undertake ultrasonic 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 ultrasonic 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 to minimise disruption, as necessary 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 in accordance with WHS and regulatory requirements

	2.6 Assess inspection areas visually and identify obvious discontinuities
3. Conduct ultrasonic tests	3.1 Select the most appropriate ultrasonic test technique for the material or application 3.2 Select the most appropriate probe and instrumental set-up and prepare these in accordance with standards and standard operating procedures (SOPs) 3.3 Conduct system verification checks and operate instrument in accordance with manufacturers' specifications and SOPs 3.4 Use appropriate calibration blocks to calibrate instrument for the expected thickness range in the material being tested 3.5 Use appropriate reference blocks to optimise instrument response for expected discontinuities at the target depth 3.6 Locate recordable discontinuities and evaluate their echo dynamics by varying probe orientation and location, as necessary 3.7 Record ultrasonic test data for specified locations, angles, and depths in accordance with relevant standards and SOPs
4. Interpret and report results of ultrasonic 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 and confirm defects in accordance with relevant codes, standards and SOPs 4.5 Seek advice for problems outside technical competence or knowledge 4.6 Record any site observations that may affect results 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 Minimise environmental impacts of testing and generation of waste 5.2 Restore test site, clean inspection area and equipment and dispose of all waste in accordance with enterprise procedures 5.3 Check, store and maintain ultrasonic testing equipment in accordance with standard operating procedures and manufacturer's instructions

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 applications include one (1) or more of the following:	• detection of metal-gas interfaces such as: cracks, laminations, shrinkage, cavities, bursts, flakes, pores; faults in bonding, welds and castings • detection of metal-solid interfaces such as: inclusions, corrosion.
Ultrasonic test data includes one (1) or more of the following:	• sound velocity • signal frequency • probe delay • echo amplitude (level 1, 2, 3) • display scale/range • test piece thickness • location (position coordinates) and size of discontinuities • sketch diagrams of test piece with defect positions, photos.

Unit Mapping Information

Current Code and Title	Previous Code and Title	Comments	Equivalence
MEM24028 Undertake ultrasonic tests	MEM24008 Perform ultrasonic testing	Superseded	Equivalent

Assessment Requirements for MEM24028 Undertake ultrasonic 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 during ultrasonic testing
- identifying and interpreting specifications, standards, drawings, charts, lists and other reference material for performing ultrasonic testing on at least two specimens.
- selecting the most appropriate ultrasonic test technique, probe, and instrument set up for the material or application
- calibrating and optimising instruments for specific materials and/or test requirements
- checking and confirming basic indicators, locating and evaluating reportable discontinuities
- identifying all defects and classifying them in accordance with national and international codes and standards
- performing accurate calculations relevant to ultrasonic testing
- reporting test results 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:

- safe work practices and procedures and use of personal protective equipment (PPE), relevant to ultrasonic testing
- principles and behaviour of ultrasound including:
 - frequency, velocity, wavelength, amplitude
 - generation and detection of ultrasound
 - characteristics of ultrasound in materials
 - attenuation, reflection, transmission and refraction at interfaces
- applications and limitations of ultrasonic testing
- requirements of any applicable standards, national/Australian standards, Safe Work Australia guidelines, State/Territory regulatory codes of practice/standards relevant to ultrasonic testing
- principles and purpose of ultrasonic tests used in job role
- variables affecting technique and equipment selection
- basic test methods including:
 - pulse-echo and transmission methods
 - resonance methods, a, b, c, and p scan
 - types of coupling
 - single, dual and two-probe methods
 - characteristics and applications associated with probes
- contact and immersion test methods and their application
- cleaning and preparation processes, procedures and WHS requirements for a variety of test surfaces
- established assessment procedures and techniques
- procedures, tools, equipment, techniques and system verification checks necessary to conduct the ultrasonic test
- calibration and instrument optimisation methods
- range of defects, types of discontinuities and their consequences
- detection and evaluation of discontinuities in accordance with codes and standards
- common variables affecting test results such as:
 - mode conversion
 - varying velocities due to grain structure
 - varying attenuation

- loss of expected response
 - complex geometries
- standard recording and reporting formats and procedures for reporting test results, job records, routine reports
- 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 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>.