



**Australian Government**

# **Assessment Requirements for MEM24018 Perform advanced ultrasonic testing**

**Release: 1**

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# Assessment Requirements for MEM24018 Perform advanced ultrasonic testing

## Modification History

Release 1. New unit.

## Performance Evidence

There must be evidence the candidate has demonstrated the ability to:

- apply WHS requirements for a test site and area to TOFD and PAUT testing
- assess geometry and condition of test area surfaces for TOFD testing and determine implications for testing on at least two occasions
- assess geometry and condition of test area surfaces for PAUT testing and determine implications for testing on at least two occasions
- select appropriate TOFD technique for a test specification on at least two occasions
- select appropriate PAUT technique for a test specification on at least two occasions
- apply relevant standards and codes to TOFD and PAUT tests
- correctly use TOFD calibration and PAUT reference blocks
- optimise TOFD and PAUT instruments for expected defects and discontinuities
- correctly place transmitting and receiving probes for TOFD testing
- perform TOFD testing on plate and tube to identify weld discontinuities and defects, and:
  - assess quality of TOFD images
  - interpret images and accept and classify defects and discontinuities according to specified acceptance criteria
- prepare TOFD test reports according to specifications and relevant standards and codes
- perform phased array ultrasonic testing to identify:
  - weld discontinuities and defects including:
    - thickness of plate and pipe
    - corrosion
    - shape defects
- select correct TOFD and PAUT evaluation method for a test specification
- interpret PAUT images and accept and classify defects and discontinuities according to specified acceptance criteria

*Note: Where a volume and/or frequency is not specified, demonstration must be provided at least once.*

## Knowledge Evidence

There must be evidence the candidate has knowledge of:

- standards and codes relevant to ultrasonic time of flight diffraction and phased array testing

- general 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
- principles of ultrasonic time of flight diffraction (TOFD) testing including:
  - transmitting and receiving probes
  - diffraction of waves from crack tips
  - calculation of crack depth
  - dead zone cause and calculation
  - influence of surface conditions of test area
- components of TOFD test equipment and their function including:
  - probes
  - encoders
  - guides
  - reference blocks
  - coupling materials
- TOFD techniques including:
  - single group TOFD
  - multiple TOFD
  - TOFD with pulse echo
  - TOFD with phased array testing
- visualisation of TOFD images
- principles of phased array ultrasonic testing (PAUT) including:
  - difference between conventional and phased array ultrasonic testing
  - transducer array pulsing and timing
  - active and elementary apertures
  - primary axis
  - secondary axis
  - beam steering and focusing
  - reference reflectors
  - transmitting and receiving delays
  - range and sensitivity setting
- types of PAUT probes and their purpose
- evaluation of PAUT indications including:
  - distance gain size (DGS) method
  - distance amplitude curve (DAC) method
  - time corrected gain (TAC) method.
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## Assessment Conditions

- Assessors must:
  - have vocational competency in performing advanced ultrasonic testing at least to the level being assessed with relevant industry knowledge and experience
  - satisfy the assessor requirements in the *Standards for Registered Training Organisations* 2015 or its replacement and comply with the *National Vocational Education and Training Regulator Act 2011*, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires.
- 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.
- There must be access to all tools, equipment, materials and documentation required, including relevant workplace procedures, product and manufacturing specifications.
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.

## Links

Companion Volume Implementation Guides are found in VETNet -

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