

MEM24008B**Perform ultrasonic testing**

Unit descriptor	This unit covers operating ultrasonic testing equipment and applying the testing procedure in a range of industrial applications.
Prerequisites	
Path 1	MEM18001C Use hand tools MEM24012B Apply metallurgy principles
Competency field	Non-destructive testing
Application of the competency	<p>This unit applies to inspecting, interpreting, classifying and reporting on ultrasonic testing techniques of fabrications, structures and components. Testing is across a wide range of industries to Level 2 (AS 3669 and AS 3998) or equivalent and includes identifying abnormalities. The work can relate to scheduled and unscheduled maintenance activities using general tools and specific ultrasonic testing equipment as specified in maintenance documentation, testing procedures or operator instructions.</p> <p>Actual and potential defects are to be considered, together with ongoing abnormalities in fabrications, components and structures on a wide range of applications. Ultrasonic tests are performed on critical component or structural zones, and may require re-assessment of competency at regular intervals in accordance with Australian standards and/or other relevant standards. All testing must be completed with particular attention to personal safety and OH&S regulations. Certification against Australian standards may be achieved where assessment in this unit of competency is carried out in conjunction with an examining authority as described in ISO 9712.</p> <p>Materials and chemicals which are subject to codes and regulations – for example, chemicals, explosives, solvents, dangerous materials, acids, or noxious waste products – are subject to safe work habits and must be stored and used in accordance with safe work practices.</p>
Related units	<p>Where power tools are required, Unit MEM18002B (Use power tools/hand held operations) should also be selected.</p> <p>Where tests require the interpretation of drawings, Unit MEM09002B (Interpret technical drawings) should also be selected.</p>
Band	A
Unit weight	6

Notes	This unit has dual status and is to be regarded as both a Specialisation band A unit and Specialisation band B unit for progression to C5 (AQF level V).
Elements Elements are the essential outcomes of the unit of competency.	Performance criteria Together, performance criteria specify the requirements for competent performance. Text in <i>italics</i> is explained in the range statement following.
1 Prepare inspection areas for ultrasonic testing	1.1 Inspection areas are identified, cleaned and prepared for testing using appropriate procedures and materials. 1.2 <i>Preparation processes</i> are carried out in accordance with the relevant procedures, statutory and OH&S requirements. 1.3 Inspection areas are visually assessed and <i>obvious discontinuities</i> are identified.
2 Perform ultrasonic testing	2.1 The most appropriate ultrasonic test for the material/application is selected. 2.2 Testing equipment is selected and prepared in accordance with standards and/or procedures. 2.3 Ultrasonic test is carried out in accordance with relevant standards, specifications and OH&S requirements. 2.4 Ultrasonic testing equipment is checked for <i>defects</i> , and maintained and stored in accordance with procedures, OH&S requirements and manufacturer instructions.
3 Interpret and report the results of ultrasonic tests	3.1 Indications are assessed and defects are detected and classified in accordance with national and international codes and standards. 3.2 Defects are confirmed in accordance with enterprise procedures and industry practices. 3.3 Test results are <i>reported</i> in accordance with enterprise procedures, accepted industry practices and customer service requirements.

Range statement

The range statement provides information about the context in which the unit of competency is carried out. The variables and scope cater for different work requirements, work practices and knowledge between States, Territories and the Commonwealth, and between organisations and workplaces. The range statement relates to the unit as a whole and provides a focus for assessment. Text in italics in the performance criteria is explained here.

The following variables may be present and may include, but are not limited to, the examples listed under the scope. All work is undertaken to relevant legislative requirements, where applicable.

Variable	Scope
<i>Preparation processes</i>	Surface cleaning and drying
<i>Obvious discontinuities</i>	Observed changes in material homogeneity
<i>Defects</i>	Corrosion, metal fatigue, deformation in non-ferrous/ferrous alloys steels, composite materials, fatigue cracks, stress

<i>Reported</i>	corrosion cracking, manufacturing defects, thickness measurement and fit, mechanical and bonded repairs, laminar tearing, welding defects and casting defects and/or aircraft components
	Accurate identification of location and size of discontinuities

Evidence guide

The evidence guide specifies the evidence required to demonstrate achievement in the unit of competency as a whole. It must be read in conjunction with the unit descriptor, performance criteria, range statement and the assessment guidelines for the Metal and Engineering Training Package.

Overview of assessment requirements

A person who demonstrates competency in this unit must be able to perform ultrasonic testing. Competency in this unit cannot be claimed until all prerequisites have been satisfied.

Context of assessment

This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate.

Interdependent assessment

This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with operating ultrasonic testing equipment and the application of the testing procedure in a range of industrial applications, or other units requiring the exercise of the skills and knowledge covered by this unit.

Method of assessment

Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.

Consistency of performance

Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts.

Required skills

Look for evidence that confirms skills in:

- interpreting and following procedures
- identifying inspection areas
- identifying discontinuities and defects
- selecting appropriate testing techniques, equipment and procedures
- analysing test results
- reading, interpreting and applying relative testing standards
- reading, interpreting and applying relative conformance standards
- performing calculations relating to ultrasonic testing
- assessing risk
- entering routine and familiar information onto proformas and standard workplace forms

Required knowledge

Look for evidence that confirms knowledge of:

- cleaning and preparation processes for a variety of test surfaces
- procedures and OH&S requirements in relation to the preparation process
- established assessment procedures and techniques
- principles of ultrasonic testing
- variables affecting test selection
- variables affecting test results
- ultrasound – frequency, velocity, wavelength, amplitude
- behaviour of ultrasound at interfaces
- characteristics of ultrasound in materials
- generation of ultrasound
- detection of ultrasound
- the flaw detector
- basic test methods:
 - 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
- calibration methods
- variables
- contact and immersion test methods
- testing methods and their application
- flaw size evaluation
- interpretation and evaluation:
 - defect types as related to product
 - codes and standards
- recording and reporting:
 - job records
 - routine reports
 - codes and standards
- written procedures:
 - presentation
 - use of standards
- types of discontinuities and their consequences
- procedures for carrying out ultrasonic tests
- tools, equipment, techniques and system verification checks necessary to carry out the ultrasonic test
- advantages and limitations of ultrasonic testing
- hazards and safety requirements associated with ultrasonic thickness testing
- maintenance and storage procedures for testing equipment
- range of defects
- methods/procedures for reporting test results
- any applicable industry standards, national/Australian standards, NOHSC guides, State/Territory regulatory codes of practice/standards
- use and application of personal protective equipment
- safe work practices and procedures