



Australian Government

MEM24036 Undertake visual testing to non-destructive testing standards

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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 has been developed for training of non-destructive testing (NDT) technicians in visual testing, including inspection of surfaces and translucent sub-surfaces, fusion welds, and the interior of pipes, cylinders, and machine components.

The unit defines the skill and knowledge for both direct visual inspection and visual testing of inaccessible areas using camera and video equipment. The unit covers visual inspection undertaken for the purposes of detecting surface and translucent sub-surface anomalies and discontinuities and conformance to specification in tested materials. Visual testing may be performed by NDT technicians in a wide range of industries and sectors, including mechanical or mechatronics engineering, manufacturing, aerospace, and associated industry sectors.

Where 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 use of Codes and Standards is required, Unit MEM24038 Apply codes and standards to non-destructive testing should also be selected.

Band: B

Unit Weight: 4

Licensing/Regulatory Information

Assessment as competent against MEM24036 Undertake visual testing to non-destructive testing standards may contribute to certification against relevant 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)

MEM24039 Apply materials technology principles to non-destructive tests

MEM30007 Select common engineering materials

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, standards, codes of practice and standard operating procedures (SOPs) for visual testing 1.2 Identify job requirements from customer specifications, job sheets or work instructions
2. Prepare for visual testing	2.1 Liaise with client to explain testing requirements and schedule tests 2.2 Use established safe work practices and personal protective equipment (PPE) in accordance with SOPs 2.3 Identify test material inspection area and determine if special access requirements appropriate for the NDT test need to be communicated to the client 2.4 Clean and prepare test area and test material for testing using appropriate procedures and materials 2.5 Arrange illumination for visual inspection according to standards and job inspection requirements 2.6 Check and prepare all test equipment in accordance with manufacturer's specifications and job specification
3. Perform direct visual testing of accessible welds, other surfaces and sub-surfaces	3.1 Place eyes at required distance and angle for weld or surface to be inspected 3.2 Use required magnification devices 3.3 Detect and measure surface features and defects 3.4 Record result for later review and reporting
4. Perform remote visual testing using camera or video equipment	4.1 Determine best approach and instrument for remote visual inspection task

	4.2 Set equipment controls for desired viewing angles and magnification 4.3 Detect and measure surface features and defects 4.4 Transfer images to suitable storage system
5. Interpret and report results of visual tests	5.1 Review conduct of tests and confirm test procedures were applied correctly 5.2 Assess information gained from visual tests and classify defects in accordance with relevant standards and codes and customer specifications 5.3 Seek professional or technical assistance on test procedures and test interpretation where required 5.4 Complete test reports according to requirements of relevant standards and customer specifications

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.	
Test material includes:	• prepared joints for welding • welds • ferrous and nonferrous metals Plus one or more of the following: • composites • plates • pipes • tanks.
Surfaces includes the surface and sub-surface of the following:	• plates • pipes

	- tanks - other manufactured or fabricated items.
Optical instruments and aids include one (1) or more of the following:	- straight edge or measuring tape with graduations of 1mm or finer - vernier callipers - feeler gauges - radius gauge - magnifying lens - lamps - profile measuring gauge - impression material - mirrors - endoscope - borescope.
Remote visual testing equipment includes one (1) or more of the following:	- cameras - video equipment - automated and computer-enhanced vision equipment - drones.
Surface defects and discontinuities include one (1) or more of the following:	- warps - mismatches of size, shape, orientation, colour or join - corrosion - cracks - surface irregularities - excessive wear.

Unit Mapping Information

Current Code and Title	Previous Code and Title	Comments	Equivalence
MEM24036 Undertake visual testing to non-	MEM24017 Perform visual testing to non-	Superseded	Equivalent

destructive testing standards	destructive testing standards		
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Assessment Requirements for MEM24036 Undertake visual testing to non-destructive testing standards

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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 material 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. One of the specimens must be either a plate, pipe, tank, or a composite material object.

Evidence required includes the ability to:

- prepare the testing area on at least three specimens for visual inspection
- comply with workplace procedures and WHS requirements at all times during visual testing
- correctly identify material part or area for visual inspection
- clean and prepare materials for visual inspection on at least three specimens
- visually inspect welds and weld joints in ferrous and nonferrous metals including:
 - inspect weld joint preparation
 - conduct visual tests during multi-run welding
 - visually test finished welds
 - visually test welds after heat treatment
- correctly operate lenses and magnifiers
- correctly operate cameras and video equipment
- correctly identify defects and irregularities including:
 - defect type and position
 - defect size
 - defect shape.

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 non-destructive testing (NDT)
- applications and limitations of visual NDT
- electromagnetic spectrum and standard names for wavelength ranges
- the physical principles and physics of light including:
 - visible wavelengths
 - natural and artificial sources of light
 - advantages and disadvantages for visual testing of different sources of artificial light
- optical characteristics relevant to visual testing including:
 - light polarisation
 - stroboscopic effects
 - dispersion
 - refraction and refraction index
 - reflection
 - absorption
 - fluorescence
- range and limits of natural eye vision
- potential effects of environmental conditions on visual testing
- potential impact on visual testing of eye condition and disorders
- lighting techniques to aid accuracy of visual testing
- camera and photo sensor operation principles
- material attributes and conditions that may affect a visual test
- welding processes and positions
- weld joint preparation faults including:
 - incorrect joint shape, dimension and assembly
 - fusion faces and adjacent surfaces not clean
 - incorrect surface treatment
- weld faults detectable through visual testing including:
 - visible cracks and cavities
 - incorrect depth and shape of gouging
 - poor slag removal

- arc strikes, tool impressions and other surface defects
 - incorrect weld profile and dimensions
 - weld root and surface defects
- NDT standards and codes test report requirements.

Assessment Conditions

- Assessors must:
 - have vocational competency in undertaking visual testing to non-destructive testing standards at least to the level being assessed
 - 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.
- There must be 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>.