



Australian Government

MEM24030 Undertake radiographic 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 work safely with X-ray equipment and gamma-ray sources in open and closed sites and undertake radiographic tests in a range of industrial applications. Personnel are required to select the most appropriate radiographic test techniques and test equipment for a specific material or application and set-up, check and optimise equipment for specific tasks. The unit also includes interpreting the test data, detecting and classifying defects using relevant standards, and reporting the results.

Radiographic tests are performed on critical components or structural zones. Personnel are required to consider actual and potential defects together with ongoing abnormalities in fabrications, critical components, structures or aircraft components.

This unit of competency applies to non-destructive testing (NDT) technicians who are performing radiographic 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 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. This unit does not cover digital and computed radiography. For these skills refer to MEM24034 Undertake digital and computed radiography.

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 MEM24030 Undertake radiographic tests may contribute to certification against the Australian NDT standards where the 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

MEM13018 Work safely with ionizing radiation

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, standards, and standard operating procedures (SOPs) for radiographic testing 1.2 Identify job requirements from specifications, drawings, job sheets, previous NDT results and/or work instructions
2. Prepare for testing	2.1 Liaise with client to explain testing/safety requirements and schedule tests to minimise disruption, as necessary 2.2 Use appropriate personal protective equipment (PPE) in accordance with standard operational procedures (SOPs) 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 radiographic tests	3.1 Select the most appropriate radiographic test technique for the material or application 3.2 Select test and processing equipment and conduct pre-use checks in accordance with relevant standards and/or procedures 3.3 Optimise quality of radiographic test set-up for various geometries 3.4 Conduct radiographic tests in accordance with relevant standards, codes and specifications 3.5 Set up and conduct radiographic tests for specialised applications 3.6 Record any site observations that may affect results 3.7 Process films to maximise quality of image and achieve optimum results
4. Interpret and report results of radiographic tests	4.1 Review conduct of the test and confirm test procedures were applied correctly 4.2 Establish conditions necessary to view and interpret radiographs 4.3 Assess indications and determine the type of discontinuity for each relevant indication 4.4 Apply acceptance criteria to discontinuities to detect defects 4.5 Classify defects in accordance with relevant national and international codes and standards 4.6 Confirm defects in accordance with workplace procedures and industry practices 4.7 Seek advice for problems outside technical competence or knowledge 4.8 Report test results 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 Secure and safely transport radiation sources in accordance with regulatory requirements

	5.3 Use radiation controls and monitoring to minimise exposure of others to radiation 5.4 Use radiation controls and specified shielding to minimise personal radiation exposure 5.5 Use radiation dosimeter to monitor personal exposure to radiation 5.6 Minimise environmental impacts of testing and generation of waste 5.7 Dispose of all waste in accordance with workplace procedures 5.8 Check, store and maintain radiographic testing equipment in accordance with SOPs and manufacturer's instructions
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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.	
Radiographic film includes one (1) or more of the following:	• X-ray class 1 and 2 films (XR1, XR2) • Gamma-ray class 1, 2 and 3 films (GR1, GR2, GR3).
Radiographic test applications include one (1) or more of the following:	• detection of subsurface cracks; corrosion, stress corrosion cracking; metal fatigue, fatigue cracks • detection of manufacturing defects • deformation in nonferrous/ferrous alloys steels • thickness measurement and fit • tube testing • detection of welding and casting defects • inspection of mechanical and bonded repairs.

Unit Mapping Information

Current Code and Title	Previous Code and Title	Comments	Equivalence
MEM24030 Undertake radiographic tests	MEM24010 Perform radiographic testing	Superseded	Equivalent

Assessment Requirements for MEM24030 Undertake radiographic 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. Each specimen tested radiographically 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. The testing process for one specimen must result in at least 10 film images for interpretation.

Evidence required includes:

- preparing the area on at least two specimens for testing and identifying discontinuities in accordance with procedures
- complying with workplace procedures, relevant regulations and WHS requirements during radiographic testing
- identifying and interpreting specifications, relevant testing standards and other reference documentation for performing radiographic testing on at least two specimens
- performing at least three of the following radiographic test techniques on one occasion each:
 - single wall, single image (plate)
 - double wall, single image (tube)
 - double wall, double image
 - double wall, double image, source superimposed
- selecting the most appropriate radiographic test technique for the material or application
- applying safe work practices and controls for minimising radiation exposure to self and others on at least two occasions:
 - ensuring security of radiation sources during storage, transport and use
 - using signs, barriers, shielding to minimise radiation exposure of public
 - reducing personal exposure time
 - maintaining greatest feasible distance between radiation source and equipment operator

- using maximum feasible shielding between radiation source and equipment operator
 - using a dosimeter to monitor personal radiation exposure
 - maintaining statutory records of the use of radiation sources and/or instruments that emit ionising radiation
- optimising the quality of radiographic test set-up for various geometries and specialised applications
- calculating film illumination/exposure and producing optimum quality radiographs
- interpreting and evaluating radiographs including confirming indicators and identifying all defects
- classifying all defects in accordance with national and international codes and standards
- reporting test results and completing job records in accordance with SOPs 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 radiographic testing
- nature and sources of radiation including:
 - principal types and sources of radiation including X-rays, Gamma rays, radioisotopes
 - production of X-rays and gamma rays, comparison on basis of energy and intensity, effect on radiographic sensitivity
 - absorption of ionizing radiation by matter, biological effects
 - exposure, shielding thickness
- radiation safe work practices and controls including:
 - measures to ensure security of radiation sources during storage, transport and use
 - signs, barriers, and shielding used to minimise radiation exposure of public
 - measures to reduce personal exposure time
 - measures to maintain greatest feasible distance between radiation source and equipment operator

- measures for maximum feasible shielding between radiation source and equipment operator
 - use of a dosimeter to monitor personal radiation exposure
 - procedures for maintaining statutory records of the use of radiation sources and/or instruments that emit ionising radiation
- principles of radiographic image formation including:
 - exposure techniques, image formation, film and chemical properties and processing techniques
 - types of films and screens, their properties and effects on image quality
 - Reciprocity law – illumination and exposure
 - preparation and use of exposure charts, radiographic equivalence charts
- requirements of all applicable national/Australian standards, Safe Work Australia guidelines, State/Territory regulatory codes of practice relevant to basic radiographic testing
- applications and limitations of basic radiographic testing
- types of materials commonly tested radiographically
- radiographic tools and equipment types
- equipment set-up procedures including:
 - system verification checks
 - common faults and damage
- safety features of radioisotope cameras and X-ray equipment
- procedures for carrying out each radiographic test
- radiographic applications used in job role
- film processing and storage
- cleaning and preparation processes for a range of test surfaces
- assessment procedures and techniques
- types of discontinuities and defects and their consequences or implications for the material or application
- standard recording and reporting formats and procedures for reporting test results, job records, routine reports
- basic maintenance and storage procedures for 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 radiographic 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>.