



**Australian Government**

# **MEM24044 Undertake basic 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 basic radiographic tests on fabrications, critical components, and/or structures. Personnel are required to follow written or verbal test instructions and use specified test equipment/materials. They are not responsible for either the choice of test method/technique used or the interpretation of results.

This unit of competency applies to non-destructive testing (NDT) technicians who are performing basic 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 supervision of NDT technicians recognised as competent in higher levels of radiographic testing; 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.

## Licensing/Regulatory Information

Individuals must adhere to the state and national safety regulation in relation to radiation use and licencing.

Assessment as competent against MEM24044 Undertake basic radiographic tests may contribute to certification against the Australian NDT standards where the assessment 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             | <p>1.1 Comply with relevant WHS and regulatory requirements, codes of practice, standards, and standard operating procedures (SOPs) for basic radiographic testing</p> <p>1.2 Use appropriate personal protective equipment (PPE) in accordance with standard operational procedures (SOPs)</p> <p>1.3 Identify job requirements from specifications, drawings, job sheets or work instructions.</p>            |
| 2. Prepare for testing                    | <p>2.1 Assemble all specified testing equipment, materials and containers and safety equipment</p> <p>2.2 Identify inspection area and determine if special access requirements are required</p> <p>2.3 Clean and prepare radiographic specimens for testing using appropriate test procedures and materials</p> <p>2.4 Assess inspection areas visually to identify obvious discontinuities</p>                |
| 3. Conduct basic radiographic tests       | <p>3.1 Use the test technique specified in work instructions or standard operating procedures</p> <p>3.2 Set up and conduct pre-use checks of radiographic testing and processing equipment in accordance with manufacturers' specifications</p> <p>3.3 Operate radiographic testing and safety equipment in accordance with relevant work instructions</p> <p>3.4 Process films to achieve optimum results</p> |

|                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                               | 3.5 Record any site observations that may affect results                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 4. Report results of basic radiographic tests | 4.1 Establish conditions necessary to view radiographs<br>4.2 Review conduct of the test and confirm test procedures were applied correctly<br>4.3 Seek advice for problems outside technical competence or knowledge<br>4.4 Report on tests undertaken 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<br>5.2 Secure and safely transport radiation sources in accordance with regulatory requirements<br>5.3 Use radiation controls and monitoring equipment to minimise exposure of others to radiation<br>5.4 Use radiation controls and specified shielding to minimise personal radiation exposure<br>5.5 Use radiation dosimeter to monitor personal exposure to radiation<br>5.6 Minimise environmental impacts of testing and generation of waste<br>5.7 Dispose of all waste in accordance with workplace procedures<br>5.8 Check, store and maintain radiographic testing equipment in accordance with SOPs 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.**

|                                                              |                                                                                                                                                    |
|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|
| Radiographic film includes one (1) or more of the following: | <ul style="list-style-type: none"><li>• X-ray class 1 and 2 films (XR1, XR2)</li><li>• Gamma-ray class 1, 2 and 3 films (GR1, GR2, GR3).</li></ul> |
|--------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|

## Unit Mapping Information

| Current Code and Title                      | Previous Code and Title | Comments                                                                                                                         | Equivalence   |
|---------------------------------------------|-------------------------|----------------------------------------------------------------------------------------------------------------------------------|---------------|
| MEM24044 Undertake basic radiographic tests |                         | This unit has been created to address a skill or task required by industry that is not covered by an existing unit of competency | Newly created |

# Assessment Requirements for MEM24044 Undertake basic radiographic tests

## Modification History

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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 on at least two (2) occasions involving different specimens. Each specimen radiographically tested 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.

Evidence required includes:

- preparing the area for testing in accordance with workplace procedures and identifying discontinuities
- complying with WHS requirements during basic radiographic testing
- undertaking basic radiographic testing using appropriate techniques and equipment for material/s to be tested
- following work instructions and SOPs for performing basic radiographic tests and applying relevant standards and specifications applying safe work practices and controls for minimising radiation exposure to self and others including:
  - 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
- producing optimum quality radiographs
- reporting on tests undertaken using standard workplace forms
- conducting testing with minimal environmental impact.

## 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:

- 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 features including:
  - set-up procedures

- system verification checks
  - common faults and damage
- safety features of radioisotope cameras and X-ray equipment
- procedures for carrying out each type of basic 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 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 basic 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>.