



Australian Government

MEM13018 Work safely with ionizing radiation

Release: 1

MEM13018 Work safely with ionizing radiation

Modification History

Release 1. Supersedes and is equivalent to MEM13013 Work safely with ionizing radiation.

Application

This unit of competency defines the skills and knowledge required to work safely with ionizing radiation when performing radiographic testing on fabrications, structures and components in a range of open or closed industrial applications across a wide range of industries.

The work can relate to scheduled and unscheduled maintenance activities, using general tools, specific radiographic testing equipment as specified in maintenance documentation, testing procedures or operator instructions.

All testing must be completed with particular attention to personal and work health and safety (WHS) regulations. Certification against Australian Standards can be achieved where assessment in this unit of competency is carried out in conjunction with an examining authority as described in AS ISO 9712 Non-destructive testing – Qualification and certification of non-destructive testing (NDT) personnel.

Materials and chemicals that are subject to codes and regulations such as chemicals, explosives, solvents, dangerous materials, acids and noxious waste products must be subject to safe work habits and must be stored and used in accordance with safe work practices.

This unit is a prerequisite to undertaking any other radiographic units of competency.

Where interpretation of technical drawings is required unit MEM09002 Interpret technical drawing should also be selected.

Where the selection and use of engineering measurement is required unit MEM12023 Perform engineering measurements should also be selected.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Band: A

Unit Weight: 4

Pre-requisite Unit

Nil

Competency Field

Work health and safety

Unit Sector

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Determine job requirements	1.1 Follow standard operating procedures (SOPs) 1.2 Comply with work health and safety (WHS) requirements at all times 1.3 Use appropriate personal protective equipment (PPE) in accordance with SOPs
2. Identify the hazards and effects of ionizing radiation in the workplace	2.1 Identify the source of ionizing radiation in accordance with relevant organisational policy and procedures 2.2 Identify attenuation factors of ionizing radiation and the biological effects on living tissue 2.3 Identify the biological effects of radiation
3. Apply radiation safety policy and procedures	3.1 Employ appropriate ionizing radiation protective measures in accordance with relevant organisational policy and procedures 3.2 Identify and adhere to exposure limits for personnel as laid down by the radiation authorities in Australia 3.3 Determine minimum exposure rates and distances from calculations and charts 3.4 Operate ionizing radiation sources in accordance with legislation, standards and organisational policy and procedures
4. Select and use radiation monitoring equipment	4.1 Select the tools and equipment necessary to monitor radiation and use according to work requirements 4.2 Select and apply techniques and system verification checks necessary to monitor radiation 4.3 Document safety breaches and report in accordance with organisational policy and procedures
5. Respond to emergency situations	5.1 Follow procedures for dealing with both X-ray and gamma ray emergency situations

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.

Radiation safe work practices and controls include the following:	- ensuring security of radiation sources during storage, transport and use - using signs, barriers and shielding to minimise the amount of radiation to which the public is exposed - 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 ionizing radiation.
Standards and codes include the following:	- the latest version of all relevant Australian and international standards and codes applicable to radiographic testing: - AS 2177 Non-destructive testing – Radiography of welded butt joints in metal - AS ISO 4993 Steel and iron castings - Radiographic testing - AS ISO 9712 Non-destructive testing – Qualification and certification of NDT personnel - codes of practice from Australian and overseas engineering and technical associations and societies.
WHS, regulatory requirements and workplace procedures include:	- WHS acts and regulations - industry codes of practice - risk assessments - safe work practices - workplace documents: - SOPs - quality procedures - equipment manuals - calibration and maintenance schedules - safety data sheets (SDS)

	• safety procedures • work schedules • workplace recording and reporting procedures • waste minimisation • containment, processing and safe disposal procedures • codes, regulations and safe work practices covering the use, handling, storage and transport of: • radiation sources • instruments that emit ionizing radiation • dangerous materials including chemicals, solvents, acids and noxious waste products.
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Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM13013 Work safely with ionizing radiation.

Links

Companion Volume implementation guides are found in VETNet -

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

Assessment Requirements for MEM13018 Work safely with ionizing radiation

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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 and include:

- following work instructions, standard operating procedures (SOPs) and safe work practices
- identifying and interpreting charts, specifications, relevant organisational policy and procedures and other applicable reference documents in the workplace when working safely with ionizing radiation
- employing appropriate ionizing radiation protective measures and personal protective equipment (PPE) relevant to the industrial application on at least two occasions
- determining minimum exposure rates and distances from calculations and charts
- undertaking numerical operations and calculations associated with determining minimum exposure rates and distances
- selecting and using appropriate tools and equipment necessary to monitor radiation on at least two occasions
- documenting all safety breaches and recording and reporting in accordance with SOPs
- demonstrating the ability to assess risks and handle emergencies.

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 PPE
- International System of Units (SI) of radiation in accordance with the National Health and Medical Research Council (NHMRC) and statutory requirements
- production of X-rays and gamma rays in relation to radiographic testing activities
- principal radioactive sources used in industrial radiography
- attenuation factors
- known biological effects of radiation
- general principles of gas ionization, photographic effect and luminescence
- use of film, film badges, ionization chamber devices, quartz fibre and fluorescent
- electronic device accuracy limits including energy and range
- different SI units of radiation, including becquerel, sievert and gray

- exposure limits for personnel as laid down by the radiation authorities in Australia
- exposure reduction factors including:
 - time
 - distance
 - shielding
- procedures for establishing safe working barriers
- relevant techniques and checks
- emergency procedures
- safety procedures for:
 - types of X-ray equipment
 - types of isotope cameras
 - shielding materials
 - design and requirements for exposure areas
 - requirements for storage of radioisotopes
- emergency situations, causes and appropriate responses
- storage requirements of equipment and materials
- legal requirements including:
 - federal and state/territory regulations and codes of practice
 - International Commission on Radiological Protection (ICRP) recommended limits for various persons and various parts of the body for short-term, long-term and accumulated exposure
 - background radiation
 - duties of Radiation Safety Officer (RSO)
 - requirements for transport
 - International Air Transport Association (IATA) regulations
 - obligations of the licensee.

Assessment Conditions

- Assessors must:
 - have vocational competency in working safely with ionizing radiation 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 and environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions. This must 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.
- 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.

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