



Australian Government

Assessment Requirements for MEM24014 Perform thermography tests

Release: 1

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Modification History

Release 1. New unit.

Performance Evidence

There must be evidence the candidate has demonstrated the ability to:

- follow work instructions, standard operating procedures (SOPs) and safe work practices
- identify and interpret specifications, relevant testing standards, codes and other reference documentation for performing thermographic testing
- prepare work areas and materials for thermographic testing
- adjust thermographic testing settings and techniques for environment conditions and ambient temperature
- select appropriate thermography techniques for at least three different materials and test specifications
- undertake numerical operations and calculations associated with performing thermographic testing
- perform the following thermographic tests on different materials and prepare a report for each test according to non-destructive standard and code requirements:
 - lock-in thermographic test (periodic excitation method)
 - pulse thermographic test
 - transient thermographic test
 - continual excitation thermographic test.

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
- applications and limitations of thermographic non-destructive testing for:
 - detection of defects in materials including cracks, cavities, voids, and inhomogeneities
 - inspection of welded joints
 - determination of material internal structure
 - detection of contaminants
 - condition monitoring

- electromagnetic spectrum and wavelength ranges for infra-red, visible light, ultra-violet, X-ray and gamma ray
- principles of heat and heat transfer including:
 - heat as energy
 - temperature scales
 - phases
 - heat transfer – conduction, convection and radiation including:
 - Fourier's law
 - Newton's law of cooling
 - evaporation fundamentals
- principles of infra-red radiation including:
 - natural and artificial sources of infra-red radiation
 - principles related to emission, reflection, transmission and absorption of infra-red radiation
 - black body, grey body and selective radiators
 - Plank's law
 - Wien's law
 - Stefan-Boltzmann law
 - Kirchoff's radiation law
 - cavity radiation effect
- thermal property of materials including:
 - emissivity
 - reflectance
 - transmittance
 - effects of surface structure and coating
- methods of temperature measurement
- qualitative thermography including:
 - definition
 - advantages and disadvantages
 - typical applications in manufacturing and engineering
 - equipment and test techniques
- quantitative thermography including:
 - definition
 - effects of temperature and the environment
 - advantages and disadvantages
 - typical applications in manufacturing and engineering
 - equipment and test techniques
- difference between passive and active thermography
- principles of excitation including:
 - sources

- type of excitation – pulse, periodic or continuous
- thermographic image capture including:
 - infra-red cameras including high-speed cooled infra-red cameras, lenses and other accessories
 - bolometers and other sensors
 - equipment factors affecting thermographic image capture including:
 - sensitivity
 - imager field of view
 - imager smallest identifiable object
 - imager smallest measurable object
 - emissivity of test material
 - focus
 - duration
 - temperature range setting
 - environment and temperature of test area
 - speed of response
 - frame repetition rate
- thermographic image analysis techniques including:
 - lock-in
 - motion compensation
 - background and other subtractions
 - data selection criteria according to job type and standards, codes and procedures
 - use of image analysis software
- thermographic image post-processing techniques.

Assessment Conditions

- Assessors must:
 - have vocational competency in performing thermographic testing 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 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.

- 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.

Links

Companion Volume Implementation Guides are found in VETNet -

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