



**Australian Government**

**Assessment Requirements for MSL975044**  
**Perform complex tests to measure**  
**engineering properties of materials**

**Release: 1**

# Assessment Requirements for MSL975044 Perform complex tests to measure engineering properties of materials

## Modification History

Release	Comments
Release 1	<p>This version was released in <i>MSL Laboratory Operations Training Package Release 2.0</i>.</p> <p>Supersedes and equivalent to MSL975016 Perform complex tests to measure engineering properties of materials. Changes to elements and performance criteria. Foundation skills information added. Range of conditions removed. Assessment requirements amended.</p>

## Performance Evidence

There must be evidence the candidate has completed the tasks outlined in the elements and performance criteria of this unit, and:

- safely prepared at least 3 different test specimens and performing complex, multi-stage mechanical tests on each.

## Knowledge Evidence

There must be evidence the candidate has knowledge of:

- details of complex, multi-stage mechanical test methods routinely used in job role, including:
  - purpose and principles of test
  - relationship between the engineering properties and uses of construction materials
  - key sample preparation stages
  - key treatment and measurement stages
  - calculation steps to give results in appropriate units and precision
  - expected values for sample type
  - sources of uncertainty and methods for their control
- principles and concepts underpinning test methods, such as:
  - stress, strain, pressure, total and effective stress, fatigue, creep, failure modes of materials, strength/consolidation of materials and permeability
  - electrical safety concepts, including voltage, current, resistance, conductors/insulators and AC/DC
- principles and concepts related to equipment/instrument operation and testing, including the function of key components and effects on test of modifying variables

- methods used to prepare samples:
  - moisture conditioning and compaction of soil
  - trimming to required size and shape
  - orientation of test pieces
  - polishing
  - curing concrete test pieces
- typical test methods and procedures:
  - consolidation of soil (e.g. one-dimensional and triaxial)
  - shear testing of soil and rock (e.g. total stress, effective stress, direct stress and triaxial stress)
  - permeability of soil, rock and concrete (e.g. falling head and constant head)
  - California Bearing Ratio (CBR) (4 point)
  - fatigue and creep of metals, polymers and concrete
  - wheel tracking in asphalt
  - stiffness and creep of asphalt
- National Association of Testing Authorities (NATA) supplementary requirements for the relevant field of testing
- workplace and/or legal traceability requirements
- awareness of environmental sustainability issues as they relate to the work task
- legal, ethical and work health and safety (WHS) requirements specific to the work task including traceability, confidentiality and security requirements of all client information, and laboratory data and records.

## Assessment Conditions

Skills must have been demonstrated in the workplace or in a simulated environment that reflects workplace conditions and contingencies. The following conditions must be met for this unit:

- use of suitable facilities, equipment and resources, including:
  - an engineering materials testing laboratory with appropriate test equipment, instruments and samples as specified in the test methods
  - test methods and description of test set-up, data sets and technical/administrative records, and workplace procedures
  - calculator and/or computer and relevant software or laboratory information management system (LIMS).

Assessors must satisfy the NVR/AQTF mandatory competency requirements for assessors.

## **Links**

Training Package Companion Volumes -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=5c63a03b-4a6b-4ae5-9560-1e3c5f462baa>