



Australian Government

MSL974014 Classify soils

Release: 1

MSL974014 Classify soils

Modification History

Release 1. New unit

Application

This unit of competency covers the ability to classify soils for geotechnical and civil construction purposes using the symbols and descriptors specified in the Australian Standard for Geotechnical Site Investigations (AS 1726-1993 Geotechnical site investigations, or its replacement). The unit involves confirming the client's requirements, physical examination of site samples, interpreting field observations and test results and assignment of an appropriate soil classification. Personnel are expected to recognise and rectify obvious errors or unexpected results, perform confirmatory tests if required and seek advice to deal with situations beyond their own technical competence.

This competency is typically performed by laboratory technicians working in the construction, mining and drilling industry sectors under the guidance of a geotechnical paraprofessional or engineer.

While no specific licensing or certification requirements apply to this unit at the time of publication, laboratory operations are governed by relevant legislation, regulations and/or external accreditation requirements. Local requirements should be checked.

Pre-requisite Unit

MSL973009	Conduct field-based acceptance tests for construction materials
MSL973010	Conduct laboratory-based acceptance tests for construction materials

Competency Field

Testing

Unit Sector

Elements and Performance Criteria

Elements describe the essential outcomes.

Performance criteria describe the performance needed to demonstrate achievement of the element.

1	Prepare to classify soil	1.1	Review job request and any accompanying documentation to identify purpose of soil classification
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samples		and client's information needs	
		1.2	Identify any hazards and relevant safe work procedures associated with the types of site samples
		1.3	Inspect supplied samples and test data, compare with specifications and record and report any discrepancies
		1.4	Liaise with client when supplied samples, test data and/or job request forms do not comply with workplace procedures and resolve any problems
		1.5	Assemble required equipment/materials and check that they are fit for purpose
2	Examine properties of soil samples	2.1	Assess appearance and feel of soil to determine moisture condition
		2.2	Use moulding/indentation tests, penetrometer and/or density index data to determine soil consistency
		2.3	Identify the soil's major, secondary and minor components and the proportion of each
		2.4	Assign a soil colour based on own observations and review of field log sheets
		2.5	Determine soil structure based on own observations and review of available zoning, defect and cementing data recorded for undisturbed field samples
		2.6	Review any additional observations and test data that may identify soil origin
3	Analyse available test results	3.1	Compare supplied mechanical test data with standard classification values for different soil types
		3.2	Compare particle size and percentage composition data with standard classification values for different soil types
		3.3	Compare other laboratory test results with own observations to confirm assignment of plasticity, grading and strength of soil samples
		3.4	Recognise anomalies or unexpected results and, if

necessary, recheck specimens and test results and conduct repeat tests to ensure reliable results

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| 4 | Record soil classification | 4.1 | Use standard symbols and descriptors to assign a valid soil classification |
| | | 4.2 | Record and store client's soil classification, samples and test data in accordance with workplace procedures |
| | | 4.3 | Maintain confidentiality of client information |
| 5 | Maintain a safe work environment | 5.1 | Use safe work procedures and personal protective equipment (PPE) to ensure personal safety and that of other personnel |
| | | 5.2 | Clean work area and collect, recycle or dispose of all waste in accordance with workplace procedures |
| | | 5.3 | Clean and check serviceability of test equipment before storage |

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.

Standards, codes, procedures and/or workplace requirements

Standards, codes, procedures and/or workplace requirements include the latest version of one or more of:

- Australian and international standards covering the requirements for the competence of testing and calibration laboratories, laboratory safety, quality management and environmental management
- national work health and safety (WHS) standards and codes of practice, national measurement regulations and guidelines, and

environmental legislation and regulations

- standard methods for classifying soils, such as those listed in *AS 1726-1993 Geotechnical site investigations*, or its replacement
- specific codes, guidelines, procedures and methods, such as:
 - AustRoads test methods and State/Territory Road Authority test methods
 - National Association of Testing Authorities (NATA) documents regarding construction materials testing (Field application document)
- workplace documents, such as standard operating procedures (SOPs); quality and equipment manuals; calibration and maintenance schedules; material safety data sheets (MSDS) and safety procedures; material, production and product specifications; production and laboratory schedules; workplace recording and reporting procedures; waste minimisation and safe disposal procedures; maps and site plans
- sampling and testing procedures for specific sites, clients and samples

Tests used to identify soil properties

Tests used to identify soil properties include, but are not limited to, one or more of:

- visual examination
- soil/water properties, such as moisture content; liquid, plastic and shrinkage limits; plasticity and liquidity indices, linear shrinkage, dispersion and permeability
- material density tests
- particle size and shape tests
- soil deformation characteristics
- soil strength tests, such as unconfined and triaxial compression, direct shear and California Bearing Ratio
- chemical tests, such as pH and organic matter

Safe work procedures

Safe work procedures include, but are not limited to, one or more of:

- use of PPE, such as hard hats, hearing protection, gloves, goggles, coveralls and safety boots
- use MSDS
- use of machinery guards
- recognising and observing hazard warnings and safety signs/barriers
- handling and storing hazardous material and equipment in accordance with labels, MSDS, manufacturer instructions, and workplace procedures and regulations

- labelling of samples, reagents and hazardous materials
- regularly cleaning equipment
- following established manual handling procedures

WHS and environmental management requirements

WHS and environmental management requirements include:

- complying with WHS and environmental management requirements at all times, which may be imposed through state/territory or federal legislation. These requirements must not be compromised at any time
- applying standard precautions relating to the potentially hazardous nature of samples

Unit Mapping Information

Release 1. No equivalent unit

Links

Companion Volume implementation guides are found in VETNet -

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

Assessment Requirements for MSL974014 Classify soils

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Performance Evidence

Evidence of competence in this unit must satisfy all of the requirements of the elements and performance criteria, and include demonstration of:

- correctly classifying at least two (2) different samples of each of the following:
 - gravel
 - sand
 - silt
 - clay
- accurately interpreting job requests, client specifications and the relevant requirements of *AS 1726-1993 Geotechnical site investigations*, or its replacement
- recognising soil characteristics and logging an accurate soil description that supports the classification given to the sample
- interpreting test results and field observations with close attention to detail and making logical conclusions
- reading graphs and tables to extract classification data, such as D10, D30 and D60 points
- comparing the physical properties of samples with test results and expected values and recognising anomalous results
- safely conducting laboratory tests to resolve anomalous results
- performing accurate calculations, such as coefficients of curvature and uniformity for gravels and sands
- seeking timely advice to deal with situations beyond own technical competence
- providing classification results within the expected timeframe
- maintaining accurate and complete records and confidentiality of client information
- efficiently setting up, checking, using and cleaning/maintaining tools and equipment
- collecting, storing and disposing of waste in accordance with workplace procedures.

Knowledge Evidence

Must provide evidence that demonstrates knowledge of:

- terms, symbols and requirements of *AS 1726-1993 Geotechnical site investigations*, or its replacement, used to perform soil classifications as part of job role
- common purposes and client requirements for soil classifications conducted as part of job role
- differences between classification of soils for agricultural and engineering purposes
- common causes of misclassification of soils, such as:
 - identification of hard clay as sand or gravel

- clayey gravels can have high plasticity
- non-representative or contaminated samples
- selecting inappropriate tests (e.g. clay-DCP and sand-penetrometer)
- testing methods used for soil classifications as part of job role
- relevant hazards, work health and safety (WHS) and environment requirements.

Assessment Conditions

- Judgment of competence must be based on holistic assessment of the evidence. Assessment methods must confirm consistency of performance over time, rather than a single assessment event.
- This unit of competency is to be assessed in the workplace or a simulated workplace environment. A simulated workplace environment must reflect realistic operational workplace conditions that cover all aspects of workplace performance, including the environment, task skills, task management skills, contingency management skills and job role environment skills.
- Foundation skills are integral to competent performance of the unit and should not be assessed separately.
- 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.
- Knowledge evidence may be collected concurrently with performance evidence or through an independent process, such as workbooks, written assessments or interviews (provided a record is kept in each case).
- This unit of competency may be assessed with:
 - MSL974012 Perform tests to determine the properties of construction materials
- Holistic assessment methods include:
 - review of soil classifications completed by the candidate
 - feedback from peers and supervisors about the candidate's ability to conduct soil classifications safely, efficiently and in accordance with work instructions
 - examples of workplace documentation completed by the candidate such as records and calculations
 - observation of the candidate performing soil classification tasks
 - oral or written questioning about soil classification procedures, test methods, common soil classification problems and interpretation of site data.
- Access is required to instruments, equipment, materials, workplace documentation, procedures and specifications associated with this unit, including, but not limited to:
 - access to job requests, client requirements, relevant site documentation and samples
 - workplace procedures, standards, test methods and equipment manuals
 - equipment and materials specified in test methods
 - safety clothing and equipment, including helmets, boots, gloves, earmuffs and glasses.
- Assessors must satisfy the assessor competency requirements that are in place at the time of the assessment as set by the VET regulator.
- The assessor must demonstrate both technical competence and currency.

- Technical competence can be demonstrated through:
 - relevant VET or other qualification/Statement of Attainment AND/OR
 - relevant workplace experience.
- Currency can be demonstrated through:
 - performing the competency being assessed as part of current employment OR
 - having consulted with a laboratory about performing the competency being assessed within the last twelve months.

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