Operation and calibration of equipment

New 2

Operate and maintain basic civil engineering laboratory equipment

Level: 3 Credits: 10

Entry information: Open.

Special notes

1 Applicable Rules, standards, and codes
ISO/IEC 17025:2005 – *General Requirements for the Competence of Testing and Calibration Laboratories* (ISO/IEC 17025);
Available at http://www.iso.org/iso/store.htm
NZS 4402:1986 - *Methods of testing soils for civil engineering purposes;*
Available at http://www.standards.co.nz.
AS TG1, February 2008 - *Simple Linear Measurement Instruments - their use, care and calibration*
AS TG2, March 2002 - *Laboratory Balances - Calibration Requirements*
AS TG3, March 2008 - *Working Thermometers - Calibration Procedures*
Available at www.ianz.govt.nz

2 Definitions
Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.
Organisational requirements refers to instructions to staff on policy and procedures which are formally documented or generally accepted at the work site. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods, standard operating procedures, specifications, manuals, and manufacturer's information.

Judgment statement

Verifier: The trainee has shown ability to meet the standard stated within this unit in accordance with company specifications, procedures and where appropriate manufacturer's instructions.
Assessor: Based on the evidence of the verifier and demonstrated skills and knowledge the candidate has met the criteria as specified within this unit including all range statements.
Focus: Throughout this area of assessment the candidate will need to consistently apply knowledge learned relating to: sound businesses practices, organisational business rules and legislative requirements relating to acts, codes and legislation listed above.

Element 1 Operate Mass measurement equipment.		
Performance Criteria	**Candidate**	**Verifier/Assessor**
1.1 Select appropriate balance in accordance with manufacturers instructions and company requirements Range: Includes but not limited to - capacity, precision, units 1.2 Perform pre-use Balance checks in accordance with manufacturers instructions company requirements Range Includes but not limited to - level, environmental conditions, safety equipment, calibration status, electrical certification 1.3 Assess sample requirements in accordance with manufacturers instructions company requirements Range: Includes but not limited to - temperature, mass, physical dimensions, environmental conditions, placement, tare 1.4 Weigh samples in accordance with manufacturers instructions company requirements Range: Includes but not limited to – zero balance (Tare), stable reading, return to zero, 1.5 Record results in accordance with company requirements 1.6 Clean and maintain balance in accordance with manufacturers instructions and company requirements		

Element 2 Operate Temperature measurement equipment.		
Performance Criteria	**Candidate**	**Assessor**
2.1 Select appropriate thermometer in accordance with manufacturers instructions and company requirements Range Includes but not limited to - range, precision, units, type 2.2 Perform pre-use thermometer checks in accordance with manufacturers instructions company requirements Range may include but not limited to – condition, environmental conditions, safety equipment, calibration status, electrical certification 2.3 Assess sample requirements in accordance with manufacturers instructions and company requirements Range: may include but not limited to – immersion depth, environmental conditions, placement 2.4 Measure temperature in accordance with manufacturers instructions and company requirements Range: may include but not limited to – stable reading, parallax errors 2.5 Record results in accordance with company requirements 2.6 Clean and maintain thermometer in accordance with manufacturers instructions and company requirements		

Element 3

Operate temperature controlled cabinets

Range may include but not limited to ovens, freezers, incubators, baths

Performance Criteria		Candidate	Assessor
3.1	Select appropriate temperature controlled cabinet in accordance with manufacturers instructions and company requirements		
Range:	Includes but not limited to - range, accuracy, precision, capacity, type		
3.2	Perform pre-use temperature controlled cabinet checks in accordance with manufacturers instructions and company requirements		
Range	may include but not limited to – temperature, humidity, condition, environmental conditions, safety equipment, calibration status, electrical certification		
3.3	Assess sample requirements in accordance with manufacturers instructions and company requirements		
Range	may include but not limited to – environmental conditions, placement		
3.4	Operate temperature controlled cabinet in accordance with manufacturers instructions and company requirements		
3.5	Record results in accordance with company requirements		
3.6	Clean and maintain temperature controlled cabinet in accordance with manufacturers instructions and company requirements		

Element 4

Operate Length measurement equipment

Range: may include but not limited to - callipers, micrometers, rulers, tape measures, dial gauges, linear variable displacement transducers (LVDT) evidence for two

Performance Criteria		Candidate	Assessor
4.1	Select appropriate length measurement equipment in accordance with manufacturers instructions and company requirements		
Range:	Includes but not limited to - range, precision, units, type		
4.2	Perform pre-use length measurement equipment checks in accordance with manufacturers instructions company requirements		
Range:	may include but not limited to – condition, environmental conditions, safety equipment, calibration status		
4.3	Assess sample requirements in accordance with manufacturers instructions company requirements		
Range:	may include but not limited to – environmental conditions, placement		
4.4	Measure length in accordance with manufacturers instructions and company requirements		
Range:	may include but not limited to – zero, stable reading, parallax errors, return to zero		
4.5	Record results in accordance with company requirements		
4.6	Clean and maintain length measurement equipment in accordance with manufacturers instructions and company requirements		

Element 5

Operate volume measurement equipment

Range: may include but not limited to - volumetric containers, pressure burettes, volume change indicators.

Performance Criteria	Candidate	Assessor
5.1 Select appropriate volume measurement equipment in accordance with manufacturers instructions and company requirements Range Includes but not limited to - range, precision, units, type 5.2 Perform pre-use volume measurement equipment checks in accordance with manufacturers instructions and company requirements Range may include but not limited to – condition, environmental conditions, safety equipment, calibration status 5.3 Assess sample requirements in accordance with manufacturers instructions and company requirements Range may include but not limited to – environmental conditions, sample properties, placement 5.4 Use volume measurement equipment in accordance with manufacturers instructions and company requirements Range: may include but not limited to – level, stable reading, parallax errors, meniscus 5.5 Record results in accordance with company requirements 5.6 Clean and maintain volume measurement equipment in accordance with manufacturers instructions and company requirements		

New 3

Operate and maintain pressure measurement equipment

Level: 3 Credits: 3

Entry information: Open.

Special notes

1 Applicable Rules, standards, and codes
ISO/IEC 17025:2005 – *General Requirements for the Competence of Testing and Calibration Laboratories* (ISO/IEC 17025);
Available at http://www.iso.org/iso/store.htm
NZS 4402:1986 - *Methods of testing soils for civil engineering purposes;*
Available at http://www.standards.co.nz.

2 Definitions
Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.
Organisational requirements refers to instructions to staff on policy and procedures which are formally documented or generally accepted at the work site. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods, standard operating procedures, specifications, manuals, and manufacturer's information.

Judgment statement

Verifier: The trainee has shown ability to meet the standard stated within this unit in accordance with company specifications, procedures and where appropriate manufacturer's instructions.
Assessor: Based on the evidence of the verifier and demonstrated skills and knowledge the candidate has met the criteria as specified within this unit including all range statements.
Focus: Throughout this area of assessment the candidate will need to consistently apply knowledge learned relating to: sound businesses practices, organisational business rules and legislative requirements relating to acts, codes and legislation listed above.

Element 1

Operate pressure measurement equipment

Range: mechanical, liquid, electronic.

Performance Criteria	Candidate	Verifier/Assessor
1.1 Select appropriate pressure measurement equipment in accordance with manufacturers instructions and company requirements Range Includes but not limited to - range, precision, units, type 1.2 Perform pre-use pressure measurement equipment checks in accordance with manufacturers instructions company requirements Range may include but not limited to – condition, environmental conditions, safety equipment, calibration status 1.3 Measure pressure in accordance with manufacturers instructions and company requirements Range: may include but not limited to – stable reading, parallax errors, temperature, barometric correction 1.4 Record results in accordance with company requirements 1.5 Clean and maintain pressure measurement equipment in accordance with manufacturers instructions and company requirements		

New 4

Operate and maintain force measurement equipment

Level: 3 Credits: 3

Entry information: Open.

Special notes

1 Applicable Rules, standards, and codes
ISO/IEC 17025:2005 – *General Requirements for the Competence of Testing and Calibration Laboratories* (ISO/IEC 17025);
Available at http://www.iso.org/iso/store.htm
NZS 4402:1986 - *Methods of testing soils for civil engineering purposes;*
Available at http://www.standards.co.nz.

2 Definitions
Samples may include but are not limited to – prepared materials and test materials such as standards and reagents.
Organisational requirements refers to instructions to staff on policy and procedures which are formally documented or generally accepted at the work site. This may include legislation; industry standards and methods; national and international standards and methods; customer/organisation developed methods, standard operating procedures, specifications, manuals, and manufacturer's information.

Judgment statement

Verifier: The trainee has shown ability to meet the standard stated within this unit in accordance with company specifications, procedures and where appropriate manufacturer's instructions.

Assessor: Based on the evidence of the verifier and demonstrated skills and knowledge the candidate has met the criteria as specified within this unit including all range statements.

Focus: Throughout this area of assessment the candidate will need to consistently apply knowledge learned relating to: sound businesses practices, organisational business rules and legislative requirements relating to acts, codes and legislation listed above.

Element 1

Operate force measurement equipment

Range: mechanical, electronic

Performance Criteria	Candidate	Verifier/Assessor
1.1 Select appropriate force measurement equipment in accordance with manufacturers instructions and company requirements Range Includes but not limited to - range, precision, units, type 1.2 Perform pre-use force measurement equipment checks in accordance with manufacturers instructions and company requirements Range may include but not limited to – condition, environmental conditions, safety equipment, calibration status 1.3 Assess sample requirements in accordance with manufacturers instructions and company requirements Range may include but not limited to – environmental conditions, placement 1.4 Measure force in accordance with manufacturers instructions and company requirements Range: may include but not limited to – stable reading, parallax errors 1.5 Record results in accordance with company requirements 1.6 Clean and maintain force measurement equipment in accordance with manufacturers instructions and company requirements		

New 5

Demonstrate knowledge of field sampling for testing of engineering materials

Level: 3 Credits: 5

Entry information: Open.

Special notes

1 The following legislation and regulations must be complied with: Health and Safety in Employment Act 1992; and Health and Safety in Employment Regulations 1995.
ISO/IEC 17025:2005 – *General Requirements for the Competence of Testing and Calibration Laboratories* (ISO/IEC 17025);
Available at http://www.iso.org/iso/store.htm

2 Assessment against this unit standard may take place in a workplace and/or provider environment.
Assessment parameters will be dependent on company and site specific equipment, procedures, and practices. Practices must reflect industry best practice and comply with legislative requirements.

3 Definitions
Company requirements include the policy, procedures, and methodologies of the company. They include legislative and regulatory requirements which may apply across the company or to a specific site. Requirements are documented in the company's health and safety plans, traffic management plans, contract work programmes, quality assurance programmes, policies, and procedural documents.
Contract specifications include plans, diagrams, and special technical conditions. They do not include special administrative conditions.
Laboratory testing requirements relate to the procedures and sample size required by the laboratory.
Hold point refers to the stage of work that requires testing, checking, or certification before work can proceed. This is to be recorded. Hold points not specified in contract documents may be stated or implied in company requirements.

4 Knowledge is required for civil engineering sampling across bituminous, concrete, aggregates and soil sectors.

Judgment statement

Verifier: The trainee has shown ability to meet the standard stated within this unit in accordance with company specifications, procedures and where appropriate manufacturer's instructions.

Assessor: Based on the evidence of the verifier and demonstrated skills and knowledge the candidate has met the criteria as specified within this unit including all range statements.

Focus: Throughout this area of assessment the candidate will need to consistently apply knowledge learned relating to: sound businesses practices, organisational business rules and legislative requirements relating to acts, codes and legislation listed above.

Element 1 Describe preparation requirements for civil engineering sampling.		
Performance Criteria	**Candidate**	**Verifier/Assessor**
1.1. Describe the purpose and requirements for sector sampling in accordance with company requirements. 1.2. Describe documentation and communication requirements for site access and safety in accordance with company requirements. 1.3. Describe where, how and when sector samples would be collected in accordance with company requirements. 1.4. Describe sampling equipment, safety equipment and container requirements in accordance with company requirements.		

Element 2 Describe sampling procedure.		
Performance Criteria	**Candidate**	**Assessor**
2.1. Describe sampling point(s) in accordance with company requirements. 2.2. Describe sampling procedures for sector sampling in accordance with company requirements. 2.3. Describe procedures for varying sampling plan in accordance with company requirements. 2.4. Describe recording and labelling procedures in accordance with company requirements. Range: sample appearance, environmental conditions and any other factors that may impact on sample integrity		

Element 3 Describe sample handling and transportation		
Performance Criteria	**Candidate**	**Assessor**
3.1. Describe sample handling procedures to maintain sample integrity in accordance with company requirements. 3.2. Describe sample transportation procedures to maintain sample integrity in accordance with company requirements.		

New 6

Calibrate and maintain laboratory test equipment in the civil engineering industry

Level: 4 Credits: 8

Entry information: Open.

Special notes

1 Performance must be demonstrated and assessed in accordance with organisational requirements.

2 *Organisational requirements* refers to instructions to staff on policy and procedures (including the application of legislation to work site situations) which are formally documented or generally accepted at the work site. This may include legislation; industry standards and methods; national and international standards and methods; standards and methods published in internationally recognised reputable texts; customer/organisation developed methods, standard operating procedures, specifications, manuals, and manufacturer's information.

3 The legislation and standards relevant to this unit standard may include but are not limited to – Health and Safety in Employment Act 1992, ISO/IEC 17025:2005 *General requirements for the competence of testing and calibration laboratories* (NZS ISO/IEC). Available at http://www.iso.org/iso/store.htm

4 Laboratory test equipment refers to: basic equipment list 7 categories. Evidence of equipment must be given across three categories.

Judgment statement

Verifier: The trainee has shown ability to meet the standard stated within this unit in accordance with company specifications, procedures and where appropriate manufacturer's instructions.
Assessor: Based on the evidence of the verifier and demonstrated skills and knowledge the candidate has met the criteria as specified within this unit including all range statements.
Focus: Throughout this area of assessment the candidate will need to consistently apply knowledge learned relating to: sound businesses practices, organisational business rules and legislative requirements relating to acts, codes and legislation listed above.

Element 1 Describe the principles of operation for laboratory test equipment.		
Performance Criteria	**Candidate**	**Verifier/Assessor**
1.1 Calibration procedure is described. 1.2 Maintenance procedure is described. 1.3 Quality control checks are identified and the type and cause of typical errors are described.		

Element 2 Prepare items for calibration.		
Performance Criteria	**Candidate**	**Assessor**
2.1 Select authorised calibration procedure. 2.2 Hazards are identified and the appropriate personal protective equipment, safety equipment and procedures are used. 2.3 All measuring equipment is confirmed as meeting the laboratory's specification requirements and complying fully with the calibration procedure. 2.4 Specified reference standards and measuring equipment are assembled, set up, and adjusted or calibrated as necessary. 2.5 Potential sources of measurement error are identified and minimised.		

Element 3 Perform calibration.		
Performance Criteria	**Candidate**	**Assessor**
3.1 Individual tests are performed within acceptable variance to ensure repeatability of measurement. 3.2 Readings are confirmed as being the result of a valid measurement and data is recorded as required. 3.3 Resulting test data is analysed in accordance with company requirements. Range: includes but not limited to – uncertainty of measurement, trends, inconsistencies, accuracy, precision, validity		

Element 4 Report and document results.		
Performance Criteria	**Candidate**	**Assessor**
4.1 Compliance/non-compliance with requirements of test and/or specifications are reported and documented and the next course of action is discussed with supervisor/ manager or colleagues. 4.2 Results of each calibration are recorded accurately. 4.3 Calibration labels, equipment stickers, quality control tags and seals are attached where required.		

Element 5 Maintain laboratory test equipment.		
Performance Criteria	**Candidate**	**Assessor**
5.1 Maintenance procedures and appropriate records are identified. 5.2 Equipment, facilities, reference standards and stocks of consumables, are maintained. 5.3 Maintenance is planned for and evaluated. 5.4 The need for maintenance for faulty or damaged equipment is identified, documented and reported.		