

# Concrete Strand – Technician Option

12019

## Carry out routine tests on fresh concrete

Level: 3 Credits: 9

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Entry information: Open.

### Special notes

- 1 Legislation relevant to this unit standard includes: Health and Safety in Employment Act, 1992.
- 2 Reference material relevant to this unit standard includes: New Zealand Standards (NZS), NZS 3104:2003 Specification for concrete production; NZS 3109:1997 Concrete construction; NZS 3112.1:1986, Tests relating to fresh concrete.  
New Zealand Standards are Available at Standards New Zealand, Wellington.
- 3 Assessment against this unit standard must be undertaken on site. *On site* refers to a wide range of building and construction environments within which trade skills are required, and includes concrete production and concrete construction sites.

### 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.

<b>Element 1</b>		
Select sample.		
<b>Performance Criteria</b>	<b>Candidate</b>	<b>Assessor</b>
1.1 Samples are collected in accordance with NZS 3109 or job specification.  Range: snatch and representative fresh concrete samples as specified in NZS 3112.1.		

<b>Element 2</b>		
Test concrete.		
<b>Performance Criteria</b>	<b>Candidate</b>	<b>Assessor</b>
2.1 Methodology for a specified test is selected and carried out in accordance with NZS 3112.1.  Range: slump test, yield tests, air content tests, compression tests, making cylinders, storing cylinders, stripping cylinders.	▪	

<b>Element 3</b>		
Complete work operations.		
<b>Performance Criteria</b>	<b>Candidate</b>	<b>Assessor</b>
3.1 Methodology and results are recorded and reported in accordance with NZS 3104.	▪	
3.2 Documentation is filed in accordance with workplace practice.		
3.3 All operations are carried out with hazard control procedures in place for identified hazards in accordance with manufacturer's recommendations, site safety plan and Health and Safety in Employment Act, 1992.		

## **18342 version 3**

### **Demonstrate knowledge of concrete production**

**Level: 4 Credits: 10**

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Entry information: Open.

Special notes

- 1 Legislation relevant to this unit standard includes: Health and Safety in Employment Act 1992, and its subsequent amendments.
- 2 Reference material relevant to this unit standard includes: New Zealand Standard (NZS) 3104:2003, Specification for Concrete Production; Australian Standard (AS) 1478.1: 2000, Chemical admixtures for concrete, mortar and grout - Admixtures for concrete.

New Zealand Standards are Available at Standards New Zealand, Private Bag 2439, Wellington.

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 concrete production.

<b>Performance Criteria</b>	<b>Candidate</b>	<b>Assessor</b>
1.1 The workability of fresh concrete is explained in terms of compactability, mobility and cohesion.		
1.2 The factors that influence workability and surface finish are identified in terms of their effects.		
1.3 The features of materials, mix proportions and the environment that affect the hardening of concrete are identified in terms of increasing or decreasing the rate of stiffening.		
1.4 The types of lightweight and heavyweight concretes are identified in terms of their applications.		
1.5 Storage and plant layout for batching and mixing concrete is described in terms of required output, situation, ground conditions, access and site facilities.		
1.6 The effects of types of admixture on the properties of fresh and hardened concrete are described in terms of classification and composition.		
1.7 The efficiency of concrete mixes is tested to meet industry standards.		

<b>Element 2</b>		
Describe ready-mix concrete production.		
<b>Performance Criteria</b>	<b>Candidate</b>	<b>Assessor</b>
2.1 The methods used for producing and supplying ready-mix concrete are identified in terms of their advantages and applications.	▪	
2.2 The capacities, total laden weights and dimensions of ready-mix concrete trucks are described in terms of contractual basis of supply and method of checking the quantity.		
2.3 Contingency plans are described in terms of a delay in discharge or delivery of concrete.		
2.4 The quantity of ready-mix concrete is identified in terms of the organisation's staffing and facilities for production.		

<b>Element 3</b>		
Describe concrete supply.		
<b>Performance Criteria</b>	<b>Candidate</b>	<b>Assessor</b>
3.1 The methods and procedures for selecting and storing materials are identified in terms of storage, stacking and testing.	▪	
3.2 The handling properties of materials are described in terms of actions taken to minimise problems.		
3.3 Quantities of materials, delivery rate and storage capacity for a concreting programme are identified in terms of mix data and available materials.		
3.4 Site mixed and ready mixed concrete are compared in terms of advantages and economics.		
3.5 The procedure for supplying ready-mix concrete is explained in terms of purchaser and supplier agreements.		

<b>Element 4</b>		
Describe Portland cements.		
<b>Performance Criteria</b>	<b>Candidate</b>	<b>Assessor</b>
4.1 Types of Portland cement are described in terms of raw materials, manufacturing processes, and applications.	▪	
4.2 Chemical compounds in Portland cement are identified in terms of their effects on the properties of concrete.		

<b>Element 5</b>		
Describe non Portland cements.		
<b>Performance Criteria</b>	<b>Candidate</b>	<b>Assessor</b>
5.1 The manufacturing processes of high alumina and supersulphated cements are described in terms of raw materials and chemical compounds.	▪	
5.2 The properties of concretes made with high alumina and supersulphated cements are compared in terms of Portland cement concrete types.		
5.3 The conversion of high alumina cement concrete is explained in terms of precautions necessary to minimise the effects of conversion.		

## **12020 version 4**

### **Demonstrate knowledge of concrete materials technology**

**Level: 4 Credits: 8**

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Entry information: Open.

Special notes

Reference material relevant to this unit standard includes:

Australian Standard (AS) AS 1478.1-2000 Chemical admixtures for concrete, mortar and grout - Admixtures for concrete.

Australian Standards are Available at Standards Association of Australia, New South Wales, Australia;

New Zealand Standards (NZS), NZS 3104:2003 Specification for concrete production; NZS 3109:1997 Concrete construction.

NZS 3111:1986 Methods of test for water and aggregate for concrete.

NZS 3112:1986 Methods of test for concrete;

NZS 3121:1986 Specification for water and aggregate for concrete.

NZS 3122:1995 Specification for Portland and blended cements (General and special purpose).

NZS 3123:1974 Specification for Portland pozzolan cement (type PP cement).

NZS 3124:1987 Specification for concrete construction for minor works.

NZMP 4212:1998 Glossary of Building Terminology. New Zealand Standards are Available at Standards New Zealand, Wellington.

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**

Demonstrate knowledge of New Zealand Standards applicable to concrete materials.

<b>Performance Criteria</b>		<b>Candidate</b>	<b>Assessor</b>
1.1	Description identifies New Zealand Standards applicable to concrete construction.		
Range	includes but is not limited to - NZS 3104, NZS 3109, NZS 3111, NZS 3112, NZS 3121.		
1.2	Industry terminology is defined in accordance with NZS 3104, NZS 3109, and NZS 3112.		
Range	compressive strength, flexural and indirect tensile strength, durability, workability, cohesiveness, bleeding, setting time, slump time, slump delivery, slump nominated, slump target, admixture, agitator, nominal aggregate size, batching plant, sampling representative, sampling snatch, sampling random, sampling selected, compaction, curing.		

**Element 2**

Demonstrate knowledge of concrete mix design principles.

<b>Performance Criteria</b>		<b>Candidate</b>	<b>Assessor</b>
2.1	Description identifies the properties of concrete in accordance with NZS 3112.	▪	
Range	properties - hardened, plastic.		
2.2	Description outlines the relationship between water, cement ratio and the strength in concrete in accordance with NZS 3112.		
2.3	Description outlines the purpose, application and effects of agents in concrete in accordance with NZS 3112, and AS 1478.		
Range	agents - air entrainment, water reducing, set controllers, accelerators, plasticisers, shrinkage inhibitors.		
2.4	Description outlines the requirements for slumps and sizes of aggregates in accordance with NZS 3104, NZS 3109, NZS 3112, and NZS 3121.		
2.5	Description outlines the proportion by weight and volume of mix in concrete in accordance with NZS 3104.		
2.6	Mix proportions for various concrete applications are described in accordance with workplace practice.		
2.7	Description identifies concrete batching and mixing equipment, its purpose, and suitability for specified situations.		

**Element 3**

Demonstrate knowledge of tests for concrete and raw materials.

<b>Performance Criteria</b>	<b>Candidate</b>	<b>Assessor</b>
3.1 Description identifies testing methods for testing materials used in the manufacture of concrete in accordance with NZS 3111, NZS 3122, NZS 3123, and NZS 3124.	▪	
3.2 Description identifies testing methods for testing concrete in accordance with NZS 3112.		

## **18340 version 3**

### **Test concrete**

**Level: 4 Credits: 10**

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Entry information: Open.

Special notes

- 1 Legislation relevant to this unit standard includes: Health and Safety in Employment Act 1992, and its subsequent amendments.
- 2 Reference material relevant to this unit standard includes:  
New Zealand Standard (NZS) 3111:1986, Methods of Test for Water and Aggregate for Concrete; NZS 3112: 1986, Methods of Test for Concrete, Parts 1, 2, 3, and 4.  
New Zealand Standards are Available at Standards New Zealand, Private Bag 2439, Wellington.

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**

Test fresh and hardened concrete.

<b>Performance Criteria</b>		<b>Candidate</b>	<b>Assessor</b>
1.1	Methods of sampling fresh concrete are described in terms of the workability tests used.		
Range	workability tests include but are not limited to - slump test, compacting factor test, vebe consistometer test, flow test.		
1.2	Fresh concrete is tested and analysed to determine the proportions of a concrete mix.		
Range	analysis methods include but are not limited to - buoyancy, rapid analysis machine, pressure filter.		
1.3	Methods of testing hardened concrete are described in terms of testing for saturated density, compressive strength and tensile splitting strength and flexural strength.		
Range	testing methods include but are not limited to - cubes, cores, flexural strength tests, surface absorption test, compression testing.		
1.4	Hardened concrete is tested to determine density, strength and flexibility.		
1.5	Fresh concrete is tested to determine air content and yield.		

**Element 2**

Outline the requirements for specialist tests for concrete.

<b>Performance Criteria</b>		<b>Candidate</b>	<b>Assessor</b>
2.1	Methods of sampling aggregates in concrete are described in terms of determining aggregate properties.	▪	
Range	aggregate properties include but are not limited to - flakiness, clay, silt, dust, density, water absorption, voids, bulking, moisture content;		
Range	sampling methods include but are not limited to - sieve analysis, field settling test, pycnometer, calculation, over-drying method, siphon-can method, modified drying method, 'speedy' method.		
2.2	Non-destructive tests for hardened concrete are described in terms of methods and purposes.		
Range	methods and purposes include but are not limited to - rebound hammer, ultrasonic pulse velocity, electromagnetic covermeter, gamma radiography, internal fracture test.		
2.3	Core testing is described in terms of procedures for drilling, preparing and compression testing of cores.		
Range	core testing includes but is not limited to - calculating in-situ cube strength, actual and potential strengths.		

## **18341 version 3**

### **Design concrete mixes**

**Level: 5 Credits: 12**

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Entry information: Open.

Special notes

- 1 Legislation relevant to this unit standard includes: Health and Safety in Employment Act 1992, and its subsequent amendments.
- 2 Reference material relevant to this unit standard includes: Specifications for Concrete Mixes; New Zealand Standard (NZS) 3109:1997, Concrete Construction; NZS 3104:2003, Specification for Concrete Production; NZS 3101:1995, Design of Concrete Structures. New Zealand Standards are Available at Standards New Zealand, Private Bag 2439, Wellington.

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 specification for concrete mixes.

<b>Performance Criteria</b>	<b>Candidate</b>	<b>Assessor</b>
<p>1.1 The specifications for concrete mixes are described in terms of their type.</p> <p>Range type includes but is not limited to - designed, standard, designated, and prescribed mixes.</p> <p>1.2 The procedures for checking the compliance of a designed mix are identified in terms of the range of possible actions in the event of non-compliance.</p> <p>1.3 Statistics are used to establish target strength requirements for concrete mix design.</p> <p>1.4 Critical areas in specification clauses are identified in terms of their effects on materials and mix selection.</p>		

**Element 2**

Design mixes for normal concrete.

<b>Performance Criteria</b>		<b>Candidate</b>	<b>Assessor</b>
2.1	The characteristics of materials and their proportioning are described in terms of their influence on mix design.	▪	
Range	characteristics could include but are not limited to - total water, free water, water/cement ratio, strength, margin, target mean strength.		
2.2	The factors in batching and mixing that affect the uniformity of concrete are identified in terms of action taken to minimise problems.		
Range	factors could include but are not limited to - weigh-batching, volume-batching.		
2.3	A trial mix of ordinary concrete is designed according to a mix design method.		
2.4	The preparation of a laboratory trial mix is described in terms of its assessment and adjustment.		

**Element 3**

Design concrete mixes for special purposes.

<b>Performance Criteria</b>		<b>Candidate</b>	<b>Assessor</b>
3.1	Specified strength concrete mixes are designed for minimum and maximum cement contents, maximum water/cement ratio, air-entrainment, conditions of exposure and sulphates in the ground.	▪	
3.2	Factors affecting mix design are identified in terms of design modifications for conditions of construction and use.		

**Element 4**

Describe the role of aggregates.

<b>Performance Criteria</b>	<b>Candidate</b>	<b>Assessor</b>
4.1 The types of natural aggregates are described in terms of production and processing.	▪	
4.2 The impurities associated with aggregates are described in terms of their effects on fresh and hardened concrete.		
4.3 The properties of lightweight aggregates are described in terms of production methods.		
4.4 The types of heavy aggregates are identified in terms of their relative densities.		

# Concrete strand – Senior Technician Option

## ***New 31***

### **Explain fresh concrete tests in the civil engineering industry**

**Level: 5 Credits: 10**

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Entry information: 18340 Test concrete.

#### 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>
- 2 Definitions  
*Samples* may include but are not limited to – prepared materials and test samples.  
*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.
- 3 Performance must be demonstrated and assessed in accordance with organisational requirements.  
Includes but is not limited to – slump test, compacting factor test, vebe consistometer test, flow test.

#### 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**

Explain a fresh concrete test method.

<b>Performance Criteria</b>	<b>Candidate</b>	<b>Verifier/Assessor</b>
1.1 The principle of the test is explained in terms of sample requirements, equipment, processes involved and results.	▪	
1.2 Critical factors of the test are explained in accordance with organisational requirements.		
Range: may include but is not limited to – temperature, environment.		
1.3 Variables of the test are explained and the options to minimise variability is described in accordance with organisational requirements.		
Range: may include but is not limited to – equipment, apparatus, material, technique, calibration, environment.		
1.4 Quality assurance of the test is explained in accordance with organisational requirements.		
Range: may include but is not limited to – sampling plan, test method, recording requirements.		

**Element 2**

Explain the application of fresh concrete test results.

<b>Performance Criteria</b>	<b>Candidate</b>	<b>Verifier/Assessor</b>
<p>2.1 The application of test results is explained in terms of material properties.</p> <p>Range: may include but is not limited to – out of specification results, in specification results, reporting.</p> <p>2.2 Critical limits of test results are explained in accordance with organisational requirements.</p> <p>Range: may include but is not limited to – uncertainty of measurement, suitability, limitations.</p> <p>2.3 Reporting requirements for test results are explained in accordance with organisational requirements.</p> <p>Range: may include but is not limited to – equipment, apparatus, material, technique, calibration, environment.</p>	<ul style="list-style-type: none"><li>▪</li></ul>	

## New 32

### Evaluate and troubleshoot fresh concrete tests in the civil engineering industry

Level: 5 Credits: 10

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Entry information: 18340 Test concrete.

#### 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>
- 2 Definitions  
*Samples* may include but are not limited to – prepared materials and test samples.  
*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 Performance must be demonstrated and assessed in accordance with organisational requirements.  
May include but not limited to – slump test, compacting factor test, vebe consistometer test, flow test.  
Evidence is required for 3 tests.

#### 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**

Evaluate results of fresh concrete tests.

**Performance Criteria**

1.1 Results are evaluated in accordance with organisational requirements.

Range: may include but is not limited to – non-conformance, corrective action taken.

**Element 2**

Troubleshoot abnormal fresh concrete test results.

**Performance Criteria**

2.1 Troubleshooting abnormal fresh concrete test results identifies the nature of the problem, uses effective problem solving techniques and reaches a valid solution in accordance with organisational requirements.

**Candidate**

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**Assessor**

## New 33

### Explain non-destructive testing for hardened concrete in the civil engineering industry

Level: 5 Credits: 10

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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>
- 2 Definitions  
*Samples* may include but are not limited to – prepared materials and test samples.  
*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.
- 3 Performance must be demonstrated and assessed in accordance with organisational requirements.  
May include but is not limited to – rebound hammer, ultrasonic pulse velocity, electromagnetic covermeter, gamma radiography, internal fracture test. Evidence is required for 4 tests.

#### 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 a non-destructive test method for hardened concrete.

<b>Performance Criteria</b>	<b>Candidate</b>	<b>Verifier/Assessor</b>
1.1 The principle of the test is explained in terms of sample requirements, equipment, processes involved and results.	▪	
1.2 Critical factors of the test are explained in accordance with organisational requirements.		
Range: may include but is not limited to – temperature, environment.		
1.3 Variables of the test are explained and the options to minimise variability is described in accordance with organisational requirements.		
Range: may include but is not limited to – equipment, apparatus, material, technique, calibration, environment.		
1.4 Quality assurance of the test is explained in accordance with organisational requirements.		
Range: may include but is not limited to – sampling plan, test method, recording requirements.		

**Element 2**

Describe the application of non-destructive test results for hardened concrete.

<b>Performance Criteria</b>	<b>Candidate</b>	<b>Verifier/Assessor</b>
<p>2.1 The application of test results is explained in terms of material properties.</p> <p>Range: may include but is not limited to – out of specification results, in specification results, reporting.</p> <p>2.2 Critical limits of test results are explained in accordance with organisational requirements.</p> <p>Range: may include but is not limited to – uncertainty of measurement, suitability, limitations.</p> <p>2.3 Reporting requirements for test results are explained in accordance with organisational requirements.</p> <p>Range: may include but is not limited to – equipment, apparatus, material, technique, calibration, environment.</p>	<ul style="list-style-type: none"><li>▪</li></ul>	

## New 34

### Evaluate and troubleshoot non-destructive testing for hardened concrete in the civil engineering industry

Level: 5 Credits: 10

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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>
- 2 Definitions  
*Samples* may include but are not limited to – prepared materials and test samples.  
*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 Performance must be demonstrated and assessed in accordance with organisational requirements.  
May include but is not limited to – rebound hammer, ultrasonic pulse velocity, electromagnetic covermeter, gamma radiography, internal fracture test. Evidence is required for 3 tests.

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**

Evaluate results of non-destructive testing for hardened concrete.

**Performance Criteria**

1.1 Results are evaluated in accordance with organisational requirements.

Range: may include but is not limited to – non-conformance, corrective action taken.

**Element 2**

Troubleshoot abnormal results for non-destructive testing for hardened concrete.

**Performance Criteria**

2.1 Troubleshooting abnormal test results identifies the nature of the problem, uses effective problem solving techniques and reaches a valid solution in accordance with organisational requirements.

**Candidate**

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**Assessor**

## New 35

### Explain testing for hardened concrete in the civil engineering industry

Level: 5 Credits: 10

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Entry information: 18340 Test concrete..

#### 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>
- 2 Definitions  
*Samples* may include but are not limited to – prepared materials and test samples.  
*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.
- 3 Performance must be demonstrated and assessed in accordance with organisational requirements.  
May include but is not limited to – flexural strength tests, surface absorption test, compressive strength, saturated density, splitting tensile strength – evidence is required for 3 tests.

#### 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**

Explain a hardened concrete test method.

<b>Performance Criteria</b>	<b>Candidate</b>	<b>Verifier/Assessor</b>
1.1 The principle of the test is explained in terms of sample requirements, equipment, processes involved and results.	▪	
1.2 Critical factors of the test are explained in accordance with organisational requirements.		
Range: may include but is not limited to – temperature, environment.		
1.3 Variables of the test are explained and the options to minimise variability is described in accordance with organisational requirements.		
Range: may include but is not limited to – equipment, apparatus, material, technique, calibration, environment.		
1.4 Quality assurance of the test is explained in accordance with organisational requirements.		
Range: may include but is not limited to – sampling plan, test method, recording requirements.		

**Element 2**

Explain the application of hardened concrete test results.

<b>Performance Criteria</b>	<b>Candidate</b>	<b>Verifier/Assessor</b>
<p>2.1 The application of test results is explained in terms of material properties.</p> <p>Range: may include but is not limited to – out of specification results, in specification results, reporting.</p> <p>2.2 Critical limits of test results are explained in accordance with organisational requirements.</p> <p>Range: may include but is not limited to – uncertainty of measurement, suitability, limitations.</p> <p>2.3 Reporting requirements for test results are explained in accordance with organisational requirements.</p> <p>Range: may include but is not limited to – equipment, apparatus, material, technique, calibration, environment.</p>	<ul style="list-style-type: none"><li>▪</li></ul>	

## New 36

### Evaluate and troubleshoot testing for hardened concrete in the civil engineering industry

Level: 5 Credits: 10

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Entry information: 18340 Test concrete.

#### 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>
- 2 Definitions  
*Samples* may include but are not limited to – prepared materials and test samples.  
*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 Performance must be demonstrated and assessed in accordance with organisational requirements.  
May include but is not limited to – flexural strength tests, surface absorption test, compressive strength, saturated density, splitting tensile strength – evidence is required for 3 tests.

#### 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**

Evaluate results of tests for hardened concrete.

**Performance Criteria**

1.1 Results are evaluated in accordance with organisational requirements.

Range: may include but is not limited to – non-conformance, corrective action taken.

**Element 2**

Troubleshoot abnormal results for hardened concrete tests.

**Performance Criteria**

2.1 Troubleshooting abnormal asphalt test results identifies the nature of the problem, uses effective problem solving techniques and reaches a valid solution in accordance with organisational requirements.

**Candidate**

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**Assessor**