



New Zealand Certificate in

Concrete Production

Level 4



Specifications

October 2020

Foreword

Welcome to the *Specifications* that set out the technical content of the New Zealand Certificate in Concrete Production (Level 4) with strands in Dispatching, Batching and Concrete Testing with an Optional Strand in Hardened Tensile Concrete Testing.

These Specifications are, collectively, a prescription for achieving the requirements of the qualification. Together they describe what a person must know and be capable of to become a qualified trade professional. They are intended to support tertiary education organisations to develop programmes that detail how learning and assessment will occur. Programmes must encompass these *Specifications* and support the development of the skills, knowledge and attributes that reflect the technical competence, self-management, professionalism and leadership.

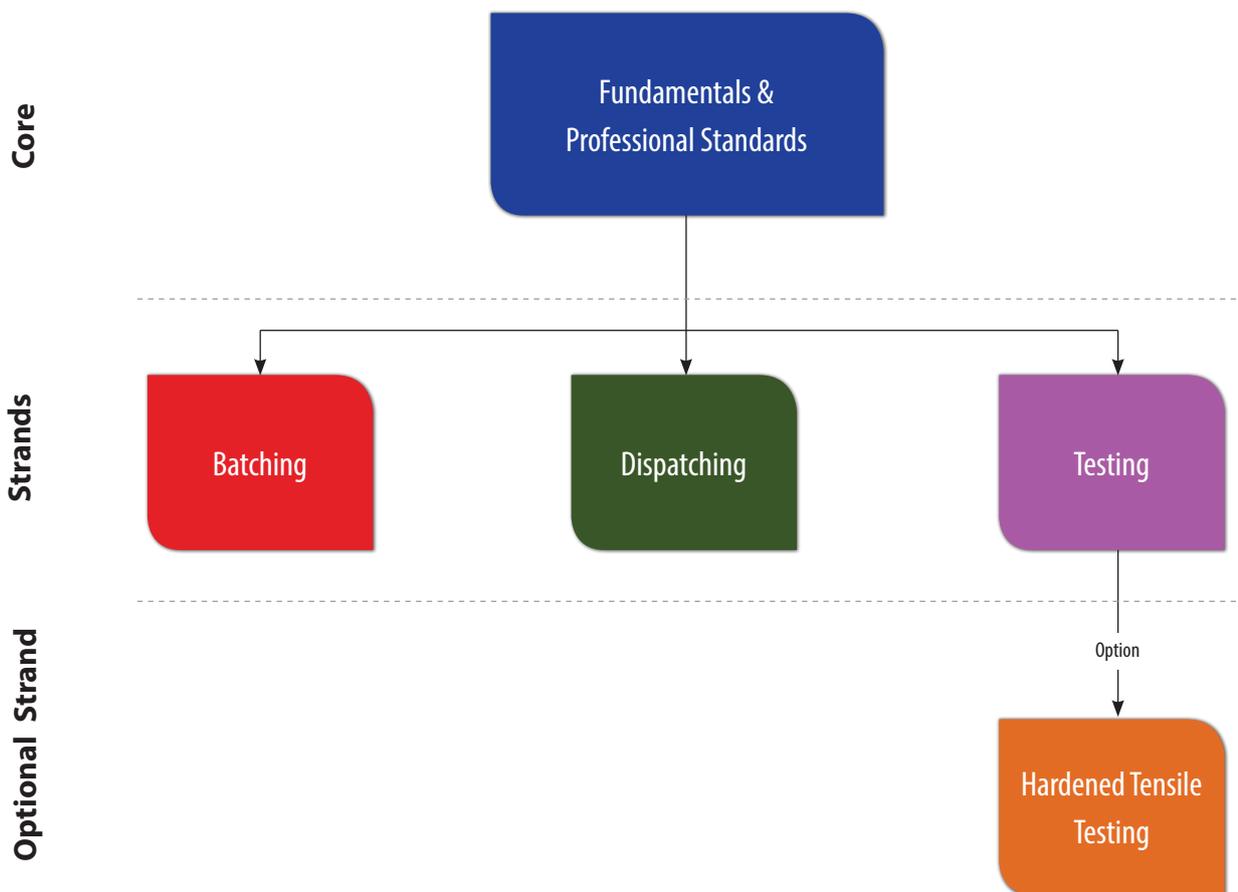
Assessment related to these Specifications

The individual skill sets included in these Specifications are designed to be read, interpreted and assessed together. This means that information contained in one skill set that is relevant to any other skill sets is stated only once, in the most appropriate place. However, the expectation is that assessment will look for links across skills sets. This avoids duplicating information and allows the candidate to be assessed holistically. Where the skills and knowledge included in one skill set are essential to achieving other skill sets, the candidate must be capable of applying them to the level, scope and complexity required.

The New Zealand Certificate in Concrete Production (Level 4) is achieved through completing the qualification core and specialising in one of the strands including:

- Dispatching
- Batching
- Concrete Testing.

Candidates completing the Concrete Testing strand can further enhance their qualification through the addition of the optional strand in Specialist Hardened Concrete Testing.



To achieve the New Zealand Certificate in Concrete Production (Level 4) in a chosen strand(s) a candidate must be capable of maintaining the professional standards of the trade and consistently performing the requirements of each skill set, and the specifications as a whole, to a commercially competent standard. Professional standards are reflected in:

- employment agreements, codes of conduct and standard operating procedures
- training and education agreements
- standards of ethics and professionalism produced by industry membership organisations
- best practice and technical guidance produced by suppliers, regulators, education and industry organisations

Commercial competence requires a candidate to be capable of consistently demonstrating the technical skills and knowledge of the trade:

- to current regulatory, industry and commercial standards
- within a commercially viable timeframe

Core Compulsory

Specification:	Fundamentals	20 credits
Skill Sets:		Covering:
Plant and equipment		Knowledge of use and care of plant and equipment
Legislation and standards		Relevant legislation and standards
Job documentation and workplace procedures		Workplace procedures and job documentation in a concrete production plant
Concrete science		Concrete science concepts and ideas
Planning and communication		The communication and planning required in a concrete production plant

Specification:	Professional Standards	20 credits
Skill Set:		Covering:
Commercial competence and professional standards		Performance standard required of a trade professional

Strands

Specification:	Batching	60 credits
Skill Sets:		Covering:
Concrete batching		Batching knowledge, tasks and practices
Calibrating batching equipment		Tasks and practices related to the calibration of concrete weighing and metered equipment in a batching plant

Specification:	Dispatching	30 credits
Skill Set:		Covering:
Forward ordering and dispatching		Forward ordering and dispatching processes required to meet relevant standards

Specification:	Testing	50 credits
Skill Set:		Covering:
Fresh and hardened concrete (compressive) testing		Practices and procedures required to meet compressive testing standards on hardened concrete

Optional strand

Specification:	Hardened tensile concrete testing	30 credits
Skill Set:		Covering:
Hardened tensile concrete testing		Practices and procedures required to meet hardened tensile concrete testing standards

To achieve this qualification specification the candidate must understand the underpinning principles and be able to apply them in practice to all areas of work in the concrete production trades.

This fundamentals specification contains the following skill sets:

- Plant and equipment
- Legislation and standards
- Job documentation and workplace procedures
- Concrete science
- Planning and communication

Each skill set comprises:

Know

(the theory that underpins the practical skills)

Do

(the practical skills the candidate must have)

Comments

(explanatory notes to clarify specific aspects of knowledge and skill)

Skill Set 1:	Plant and Equipment	4 credits
Know	<p>The different types of plants used for the production of concrete</p> <p>The procedures for the transport and supply of concrete to the plant</p> <p>The use and application of different items of plant and equipment used for concrete production</p> <p>How to care for and maintain different items of plant and equipment used for concrete production</p>	
Comments	<p>Different types of plants include live storage and central mix plants with combinations of overhead aggregate bins or loader fed bins.</p> <p>Procedures may vary from one plant to another</p>	

Skill Set 2:	Legislation and Standards	5 credits
Know	<p>How to read and interpret standards relevant to concrete production</p> <p>The health and safety legislative framework as it applies to concrete production</p> <p>The environmental legislative framework as it applies to concrete production</p> <p>The construction legislative framework as it applies to the production and use of concrete</p> <p>The transport legislative framework as it applies to the production and supply of concrete</p> <p>The reasons for plant audits</p>	
Do	<p>Practically apply the health and safety legislative framework in everyday contexts in concrete production operations includes the use of approved workplace health and safety practices</p> <p>Practically apply the environmental legislative framework in concrete production operations.</p> <p>Practically applying the construction legislative framework includes producing concrete to the correct NZ standard and meeting all audit requirements</p> <p>Practically apply the transport legislative framework in everyday contexts within concrete production operations</p>	
Comments	<p>The legislative framework refers to the hierarchy of Acts of Parliament, Regulations, Rules, local by-laws, Codes, Standards, approved codes of practice, and best practice guidelines.</p> <p>The construction framework encompasses the standards relating to the design and performance of raw materials, production processes, testing requirements and site delivery reflected in NZS 3104 and NZS 3109.</p> <p>Audit requirements are the compliance details required in the plant audit handbook as published by Concrete NZ.</p> <p>The level of legislative knowledge required is that of a trade professional rather than that of an expert with specialist knowledge.</p>	

Skill Set 3:	Job documentation and Workplace Procedures	3 credits
Know	The different workplace procedures used in the production and supply of concrete How to complete job documentation in the concrete production plant	
Comments	Documentation includes all formal workplace documentation and records relevant to concrete production. Workplace procedures include all the formal and informal procedures related to concrete production.	

Skill Set 4:	Concrete Science	5 credits
Know	The constituents related to concrete manufacture and their properties Concrete mix design The properties of fresh concrete mix The properties of hardened concrete The various applications of concrete The effects of adverse or unfavourable weather conditions on concrete	
Comments	The concrete mix design can vary according to the ratios of constituents. Adverse weather conditions can impact on the hydration of the concrete mix. The level of concrete science knowledge required is that of a trade professional rather than that of an engineer.	

Skill Set 5:	Planning and Communication	3 credits
Know	The roles and responsibilities of other parties Methods of communication with others involved in the production of concrete How to plan and coordinate work with other parties in the concrete production workplace	
Do	Work, plan and communicate with your own team and other parties in the production and supply of concrete	
Comments	Other parties in the production and supply of concrete can include clients, engineers, suppliers of raw materials, designers, compliance bodies and contractors. Working and planning effectively involves everyday contact in the workplace and the ability to discuss and reach conclusions about work requirements and the integration of activities to meet work schedules. Communication involves written, oral and graphic communications.	

This standard is designed to be achieved at the culmination of an apprentice's training and describes the performance standard expected of an apprentice who is ready to make the transition to becoming a qualified trade professional.

The assessment process for this standard involves:

- regular consideration by all members of the Assessment Team of how the apprentice's independence and learning is progressing
 - discussion and feedback to members of the Assessment Team on progress made
 - identification of the next steps for developing the apprentice's leadership, self-management and professionalism.
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Skill set:	Professional standards	20 credits
Know:	<p>The knowledge and practical skills involved in the concrete production trade</p> <p>The ways in which professional standards contribute to the sustainability of the relevant strand(s) in the concrete production trade</p> <p>How to locate and interpret industry professional standards.</p>	
Do:	<p>Perform all aspects of the relevant concrete production strand(s) to a commercially competent standard</p> <p>Behave professionally on site on a day-to-day basis</p> <p>Fulfil responsibilities in the workplace under commercial contracts, employment and educational agreements</p> <p>Self-manage ongoing learning and development</p> <p>Keep up to date with the professional standards in the relevant strand(s) of the concrete production trade</p> <p>Support the learning and development of others in training</p> <p>Lead and coordinate everyday on-site operations in the relevant strand(s) of the concrete production trade.</p>	
Comments:	<p>A commercially competent standard means completing work to a commercial standard in a commercial environment without direct supervision</p> <p>Demonstrating professional behaviour on a day-to-day basis is likely to include working constructively with clients, suppliers and people involved in the candidate's learning programme, being consistently reliable, responsible and accountable, acting with integrity, making and keeping commitments, and showing respect and consideration for people, property and the environment</p> <p>Industry sustainability refers to the economic, environmental and social practices that contribute to the sustainability and improvement of the concrete production industry.</p> <p>Behaving professionally includes presenting a positive company image, positive body language and personal presentation.</p>	

To achieve this qualification specification the candidate must understand and apply concrete batching and calibration of batching equipment in accordance with NZS 3104 and the plant audit handbook.

This specification contains the following skill set:

- Forward Ordering and Dispatching
- Calibrating batching equipment

The skill set comprises:

Know

(the theory that underpins the practical skills)

Do

(the practical skills the candidate must have)

Comments

(explanatory notes to clarify specific aspects of knowledge and skill)

Skill Set 1:	Concrete Batching	50 credits
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Know	The reasons for compliance and testing to NZ standards
	How to test the free moisture content of materials
	How to adjust weights and volumes to meet mix design
	How to store aggregates
	How to recognise aggregates that are out of tolerance
	When a mix is out of tolerance and the appropriate action required
	The types of admixtures and additives and their effects
	The effects of added water above design
	Batching sequence and mixing
Rules and procedures for reuse of returned concrete	

Do	Perform prestart and end of day inspections, cleaning and maintenance of batching area
	Make aggregate moisture adjustments to comply to NZ standards for concrete batching
	Weigh and load materials within the permitted tolerances of NZ Standards
	Review the weighed and metered quantities of material
	Batch the load within correct tolerances
	Visually observe the slump
Complete batching job documentation	

Comments	Reviewing weighed and metered quantities includes analysing records for incorrect weights.
	Testing free moisture content refers to making a comparison between the ideal and actual weights for dry materials and adjusting the mix to meet the required standard.
	Visually observing slump involves checking the consistency of the mix.
	The standards applied to batching concrete include NZS 3104.

Skill Set 2:	Calibrating Batching Equipment	10 credits
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Know	The audit requirements for scale and metre calibrations
	How to check the calibration of batching equipment

Do	Perform calibration checks of weighing scales
	Perform calibration tests of metered measuring equipment

Comments	The calibration of weighing equipment is done at regular intervals to guarantee weighing accuracy of cement and aggregate scales.
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Specification:

Dispatching

30 credits

To achieve this qualification specification the candidate must understand and apply ordering and dispatching processes of NZS 3104 and NZS 3109.

This specification contains the following skill set:

- Forward Ordering and Dispatching

The skill set comprises:

Know

(the theory that underpins the practical skills)

Do

(the practical skills the candidate must have)

Comments

(explanatory notes to clarify specific aspects of knowledge and skill)

Skill Set:

Forward Ordering and Dispatching

30 credits

Know

How to process forward orders

The dispatching process

How to determine appropriate concrete requirements

How to determine load delivery requirements and transport logistics

Do

Dispatch ready mix concrete from plant

Enter job sheets into ready mix record system

Order materials as required

Allocate and redirect trucks as required

Schedule driver breaks

Record correct and accurate information and process concrete orders

Comments

Load delivery requirements relate to conditions specific to the site.

Transport logistics are general requirements relating to the route, the environment the ready mix truck will travel and coordination required with other parties.

Materials are ordered as required.

Processing orders includes recording all relevant details and then confirming and checking this information. Orders are actioned according to workplace requirements.

Specification:

Concrete Testing

50 credits

To achieve this qualification specification the candidate must understand and perform fresh and hardened compressive concrete testing to reflect the requirements of the relevant NZ Standards including 3104.

This specification contains the following skill set:

- Fresh and hardened compressive concrete testing

The skill set comprises:

Know

(the theory that underpins the practical skills)

Do

(the practical skills the candidate must have)

Comments

(explanatory notes to clarify specific aspects of knowledge and skill)

Skill Set:	Fresh and hardened compressive concrete testing	50 credits
Know	Procedures for fresh and hardened concrete testing to the NZ standards	
	Common admixtures and their effects on concrete	
	How to recognise imperfection in aggregates	
	How to test for moisture in aggregates	
	How to calibrate testing equipment	
	How to read testing data and take appropriate action	
Do	Perform tests on fresh concrete	
	Perform compressive testing on hardened concrete	
	Perform moisture tests on sand and aggregate	
	Perform calibration checks on testing equipment	
	Report any irregularities and complete documentation procedures	
Comments	Calibration tests include tests on slumping and testing equipment.	

OPTIONAL STRAND

Specification:

Hardened Tensile Concrete Testing

30 credits

To achieve this qualification specification the candidate must understand and perform hardened tensile concrete testing in accordance with NZ standards and industry practice.

This specification contains the following skill set:

- Hardened tensile concrete testing

The skill set comprises:

Know

(the theory that underpins the practical skills)

Do

(the practical skills the candidate must have)

Comments

(explanatory notes to clarify specific aspects of knowledge and skill)

OPTIONAL STRAND

Skill Set:

Hardened Tensile Concrete Testing

30 credits

Know

Material sieve analysis

Procedures for tensile splitting testing

Procedures for flexural tensile testing

Procedures for shrinkage

Do

Carry out sieve testing of fine and coarse aggregate

Carry out tensile testing of concrete

Document testing procedures

Comments

Tensile testing of concrete includes testing for tensile splitting strength, flexural tensile strength, and drying shrinkage

Sieve testing is determined by the grading references within NZS 3111

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