

Title	Demonstrate knowledge of structural prestressed concrete element manufacture		
Level	3	Credits	25

Purpose	People credited with this unit standard are able to demonstrate knowledge of: preparation, setting up moulds and storage areas, the pre-pour process, placing and testing concrete, and finishes for concrete; for structural prestressed concrete element manufacture; and curing, destressing and demoulding, lifting and storing, post-pour checks and remedial work, and delivery processes; for prestressed concrete elements.
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Classification	Concrete > Precast Concrete
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Available grade	Achieved
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Guidance Information

1 Definitions

Specifications refers to documented instructions (oral, written, graphic) and may include any of the following – manufacturer’s specifications, recommendations or technical data sheets; material specifications; specifications from a specialist source such as an architect, designer, engineer or a supervisor; site or work specific requirements.

Workplace practice refers to the documented procedures specific to a workplace which set out the standard and required practices of that workplace.

2 For the purpose of this unit standard, evidence may be collected using specifications from a real workplace situation, or using given specifications for a simulated scenario.

3 Credit for this unit standard indicates compliance with industry practice. *Industry practice* refers to the ability to demonstrate knowledge that reflects the productivity, uniformity, finish quality and material economies currently accepted within industry.

4 Legislation and publications relevant to this unit standard include: Health and Safety in Employment Act 1992 and Health and Safety in Employment Regulations 1995; Building Act 2004;

NZS 3109:1997 *Concrete construction*, and NZS 3114:1987 *Specification for concrete surface finishes*, available from Standards New Zealand

(<http://www.standards.co.nz>).

Approved Code of Practice for the Safe Handling, Transportation and Erection of Precast Concrete, available from Department of Labour

(<http://www.osh.dol.govt.nz/order/catalogue/pdf/concrete-ac.pdf>).

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of preparation for structural prestressed concrete element manufacture.

Performance criteria

- 1.1 Manufacture of structural prestressed concrete elements is described and explained in accordance with given specifications and shop drawings.
- Range beam column, panel, flooring unit; situation of element in main structure, key items relating to element in specifications.
- 1.2 Manufacture of structural prestressed concrete elements is described and explained in accordance with production programme, including timeframe of job in relation to rate of manufacture and available labour hours.
- 1.3 Tools and equipment used for manufacture of structural prestressed concrete elements are identified and described in terms of purpose and function.
- Range permanent prestressing rig, mobile prestressing rig, timber moulds, steel moulds, fibreglass moulds, concrete formed moulds; five items of related tools and equipment.
- 1.4 Considerations when selecting casting area for structural prestressed concrete elements using a mobile prestressing rig are described and explained in terms of job requirements.
- Range element to be manufactured, size of work area needed, where elements will be stored/stockpiled, safety in and around moulds, environmental factors, other work operations.
- 1.5 Considerations related to strand are identified and described for use in manufacture of structural prestressed concrete elements.
- Range verification of certification, size, grade, storage and access.

Outcome 2

Demonstrate knowledge of setting up prestressing equipment, storage areas and moulds for structural prestressed concrete element manufacture.

Performance criteria

- 2.1 Setting up of prestressing equipment for structural prestressed concrete elements is described in terms of job requirements from given specifications.
- Range permanent prestressing rig, mobile prestressing rig.

2.2 Setting up of area for manufacture and storage of structural prestressed concrete elements is described in terms of job requirements from given specifications.

Range beam, column, panel, flooring unit.

2.3 Setting up of moulds for structural prestressed concrete elements is described in terms of associated prestressing equipment, in accordance with job requirements from given specifications.

Range stressing capacity of mould (jack sizes and positions), crosshead setup in relation to main part of mould, endplate setup in relation to strand size, strand extension lengths, barrels and wedges, power packs, strand pack position, protection barriers, alarms.

Outcome 3

Demonstrate knowledge of the pre-pour process for structural prestressed concrete element manufacture.

Performance criteria

3.1 The pre-pour process for structural prestressed concrete elements is described and explained in terms of sequence and job requirements from given specifications.

Range identification of strand type and size, identification of reinforcing type and size, gathering of materials, initial setup of mould, placement of strand in mould, initial placement of reinforcing in the mould, safety devices in place before stressing of strand, pre-loading of strand to specified tension, checking of strand pre-load extension lengths, full specified loading of strand, final check of strand extension lengths, lock off pre-stressing equipment, tying off reinforcing, placement of bar chairs on strand and reinforcing, final setup of mould, securing of remaining bar chairs, placement of cast in items, securing of final mould attachments, pre-pour quality assurance procedures.

Outcome 4

Demonstrate knowledge of placing and testing concrete for structural prestressed concrete element manufacture.

Performance criteria

4.1 Placing concrete for structural prestressed concrete element manufacture is described in accordance with NZS 3109:1997, given specifications and workplace practice.

Range factors to consider – segregation, layers, screeding, continuity of supply, vibration method, protection of strand.

- 4.2 Testing requirements for structural prestressed concrete element manufacture are identified in accordance with NZS 3109:1997 and given specifications.

Outcome 5

Demonstrate knowledge of finishes for concrete for structural prestressed concrete element manufacture.

Performance criteria

- 5.1 Methods for finishing structural prestressed concrete elements are described in accordance with NZS 3114:1987 and workplace practice.

Range from NZS 3114:1987 – four of F series, two of U series.

- 5.2 Type B construction joints are described in terms of purpose and function, and in accordance with NZS 3109:1997.

Outcome 6

Demonstrate knowledge of curing, destressing and demoulding structural prestressed concrete elements.

Performance criteria

- 6.1 Methods for curing structural prestressed concrete elements are described in accordance with NZS 3109:1997, given specifications and workplace practice.

Range two different curing methods, including testing procedures related to the curing.

- 6.2 Methods for destressing structural prestressed concrete elements prior to demoulding are described in terms of sequence, job requirements from given specifications, and workplace practice.

Range beam, column, panel, flooring unit.

- 6.3 Methods for demoulding structural prestressed concrete elements are described in terms of sequence, job requirements from given specifications, and workplace practice.

Range permanent prestressing rig, mobile prestressing rig.

Outcome 7

Demonstrate knowledge of lifting and storing structural prestressed concrete elements.

Performance criteria

7.1 Safe lifting practices for structural prestressed concrete elements are described in accordance with given specifications, workplace practice and manufacturer's specifications.

Range equipment needed, lifting techniques.

7.2 Storage practices for structural prestressed concrete elements are described and explained in accordance with given specifications and workplace practice.

Range factors to consider – area suitable for high loadings, height capacity, delivery sequence versus storage sequence, dunnage points, pre-cambre.

Outcome 8

Demonstrate knowledge of post-pour checks and remedial work for structural prestressed concrete elements.

Performance criteria

8.1 Checking structural prestressed concrete elements for possible defects is described in accordance with workplace practice.

Range method, documentation required.

8.2 The process for remedial work on defects in structural prestressed concrete elements for possible defects is described in accordance with given specifications and workplace practice.

Range three defects.

Outcome 9

Demonstrate knowledge of delivery processes for structural prestressed concrete elements.

Performance criteria

9.1 Use of standard forms associated with delivering structural prestressed concrete elements is described in accordance with workplace practice.

9.2 Loading of structural prestressed concrete elements for delivery is described in accordance with given specifications and workplace practice.

Range methods for – loading, placement of dunnage, securing load on vehicle.

This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	20 August 2010	31 December 2023
Review	2	28 October 2021	31 December 2023

Consent and Moderation Requirements (CMR) reference

0048

This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.